

Historic, Archive Document

Do not assume content reflects current scientific knowledge, policies, or practices.

The Agricultural Student

Poultry Number



January 1913

15¢ per Copy

\$1.00 per Year

If we could once get squarely before the sheepmen of Ohio, all the good points of this

Stewart Little Wonder Shearing Machine



we are confident that every owner of 200 sheep or more would have one of these outfits.

There is a two-horse power gasoline engine that is truly a marvel of compactness and energy. It will not only work to shear sheep, but will do any other work that two-horse power can accomplish.

It will earn its own way and pay a profit on any farm.

The two shearing machines supplied on it are our

latest model and carry the celebrated Stewart wide shear.

It is worth your while to look into the merits of this outfit. Write for our complete catalogue on it.

Send now and if you decide to get one, order early.

CHICAGO FLEXIBLE SHAFT COMPANY

82 La Salle Avenue, CHICAGO

More Money For Cream

We need more cream to take
care of the increasing demand
for our

"DAISY BRAND" BUTTER.

Better start today and ship us
what you can spare.

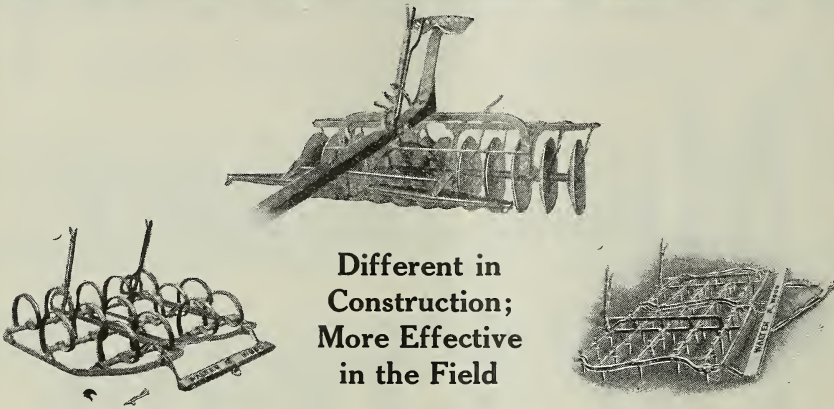
"Checks Mailed for Each Shipment"

We pay one cent above Elgin Market for
Butterfat



The Ohio Dairy Co.

COLUMBUS, OHIO



**Different in
Construction;
More Effective
in the Field**

than all other harrows. Like other Walter A. Wood Farm Implements, the big line of

WALTER A. WOOD HARROWS

differ from other harrows in ways that count most—results in the field.

The Walter A. Wood Disc Harrow

has two equalizing springs which keep the two flexible gangs down to their work, make weight boxes unnecessary and insure even cultivation. The gangs are independent of each other and each can follow the inequalities of the ground directly beneath it without reference to the other. The draft is direct and low, cutting out neck-weight.

The Walter A. Wood Spike-Tooth Harrow

has relief springs on the adjusting bars which allow the teeth to yield to obstructions and prevent breakage. The teeth have three sharp edges; the two not in use being sharpened by the soil. No other harrow has these features of practical value.

The Walter A. Wood Spring-Tooth Harrow

does not run on the frame, but on adjustable steel runners with renewable shoes. This gives exceptionally light draft. The exclusive relief springs on the tooth-bars permit an extra hook to the teeth and they enter the ground with a cutting motion and not flatwise as is usual.

These are just a few points wherein the Wood Harrows are so superior to all others. It will pay you to

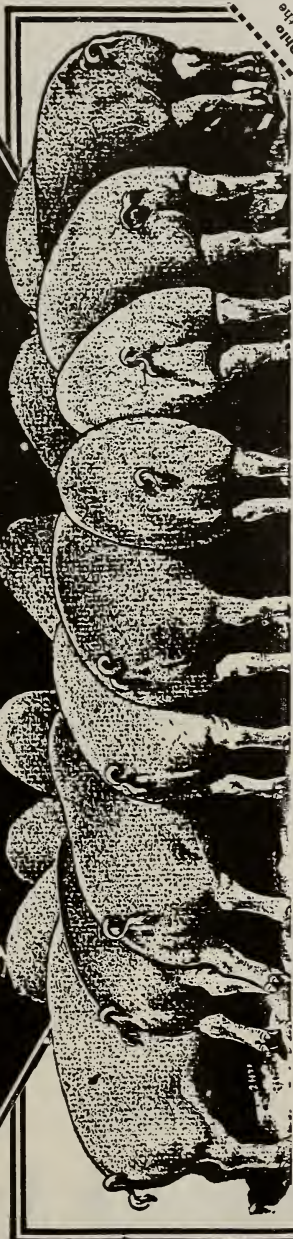
SEND FOR OUR GENERAL CATALOG

and study the many other features about Wood Harrows
and the big Wood Line of Farm Implements. Do it now.

Walter A. Wood Mowing & Reaping Machine Co.

32 SWAN ST., COLUMBUS, OHIO.

Pigs Without Worms



I'll Stop Your Losses from Worms—Before You Pay

Little pigs only a few weeks old are often found loaded with worms. Hogs of all ages suffer from these deadly parasites. Then cholera, swine plague and other contagious diseases get in their destructive work. Stock troubled with worms don't thrive; they cough, have fever, act dull, and don't gain a pound. Your feed is wasted; your profits are stolen. Your animals frequently die, causing total loss of many dollars. I'll stop all this quick with Sal-Vet, the great worm destroyer and conditioner. I have done it for thousands of others. I'll do it for you, before you pay me a penny, if you will just send me the coupon.

Send No Money—Just the Coupon

If you will fill out the coupon—tell me how many head of stock you have—mail it to me, I'll ship enough Sal-Vet to last them 60 days and will pay the freight charge when it arrives, and when the 60 days are up report results. If it does not rid all your stock of the deadly stomach and free intestinal worms, I'll cancel the charge—you won't owe me a cent!

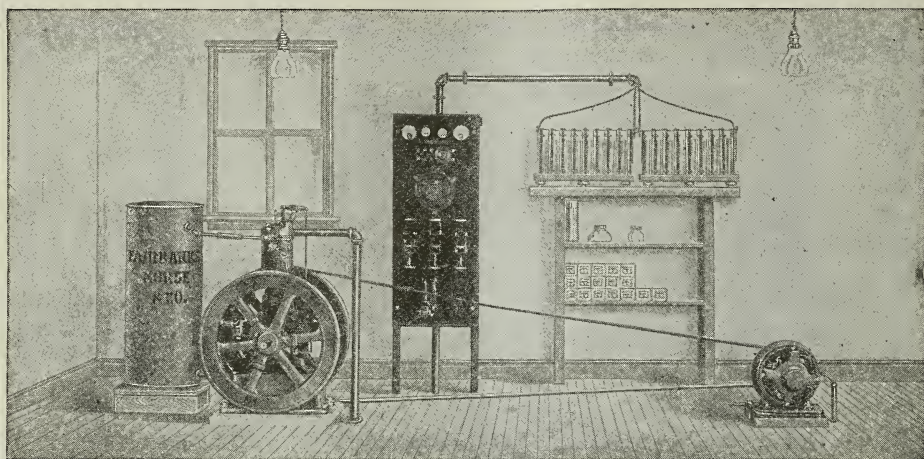
SPRAY R. FEL, Pres. THE S. R. FEL CO., Cleveland, Ohio

Does not hurt and never returns to last my stock 60 days and will pay for it. It does not hurt you or cancel like other.

Shipping Sta. _____
State _____
County _____
Post Office _____
Name _____

Prices
 40 lbs. \$2.95, 100 lbs. \$5.40,
 200 lbs. \$9.90, 500 lbs. \$21.12,
 No order filled less than 40 lbs.

Read This Letter: "Have fed Sal-Vet to my hogs and lost none. Neighbors both sides of me, east and west, have had cholera bad. One west of me, on adjoining farm, lost about forty head of pigs and calves, on adjoining farm, lost all he had, excepting four,"
A. J. HOFFMAN, Leipsie, Ohio.



A Fairbanks-Morse Electric Plant

will give you all the lighting conveniences and health benefits that the city resident enjoys from the large central stations.

No Matter Where You Live

you can have splendid, soft, clear, electric light anywhere about your home or buildings at very slight cost. And the Fairbanks-Morse outfit is reliable at all times, easy to operate and **absolutely safe**.

Fairbanks-Morse Electric Plants are complete units, consisting of Engine, Dynamo, Storage Battery, Switchboard, 50 Mazda Lamps and all the necessary shades and fixtures.

The engine is simple, strong and dependable.

Runs on Kerosene, Gasoline, or Low Grade Distillates

and has ample power to run a water system or do other work in addition to running the dynamo. The cost of the fuel practically covers all expense for lights.

Write for Catalog No. 451WK.

Fairbanks, Morse & Co.

CINCINNATI

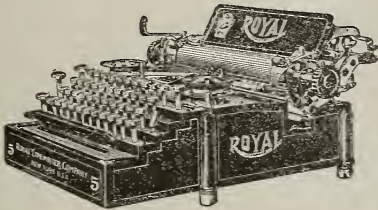
CLEVELAND

LOUISVILLE

CHICAGO

Fairbanks Scales, Oil Traction Engines, Pumps, Water Systems, Electric Light Plants, Windmills, Feed Grinders, Saw Frames, Spray Outfits.

New Model OF THE ROYAL STANDARD TYPEWRITER



Has Two Color Ribbon
Back - Spacer, Tabulator

and many new and valuable
patented features that other
typewriters do not have

PRICE, \$75

Send for "The Royal Book," 32
pages of typewriter information
—the finest typewriter catalog
ever issued. Yours for a postal
card.

ROYAL TYPEWRITER CO.

Royal Typewriter Bldg., New York
414 HAYDEN BLDG.,
COLUMBUS, OHIO.

The World Famed OLIVER PLOWS

THE STANDARD OF EXCELLENCE



Designed and built to please the
farmers.

A plow for every condition, varying
in capacity from a Goober to a No. 55
Bottom Engine Gang.

Made with skill, sold with confidence,
used everywhere.

Oliver Chilled Plow Works

General Offices:
SOUTH BEND, IND., U. S. A.

Works at
South Bend, Ind., and Hamilton, Ont., Canada

Branch Houses at

Portland, Me.
Rochester, N. Y.
Harrisburg, Pa.
Philadelphia, Pa.
Richmond, Va.
Mansfield, Ohio.
Indianapolis, Ind.
Louisville, Ky.
Chattanooga, Tenn.
Nashville, Tenn.

Memphis, Tenn.
Cedar Rapids, Ia.
St. Louis, Mo.
Kansas City, Mo.
Dallas, Texas.
Milwaukee, Wis.
Crookston, Minn.
Billings, Mont.
Portland, Ore.
San Francisco, Cal.

Clay, Robinson & Co. Make Money for You

By bringing to bear upon your live stock consignments the best efforts of a selling organization developed and perfected by twenty-six years of constant study and effort.

You cannot possibly find a live stock commission firm of higher commercial and financial standing; that has a better staff of salesmen; or that will work harder to secure top market value for your consignments.

Further, it makes no difference whether you are a small or a large feeder, experienced or inexperienced, we do our very best for you just the same—and that means that no one can do more or better.

*Therefore, to insure utmost Security,
Satisfaction and Profit, you should*

SHIP YOUR STOCK TO

CLAY, ROBINSON & COMPANY

Chicago
Denver

E. Buffalo
So. Omaha

E. St. Louis
Sioux City

Kansas City
Fort Worth

So. St. Joseph
So. St. Paul



CONTENTS

	Page
COVER PAGE—Copyright, 1910.	
FRONTISPIECE—Winter on University Campus.	
POULTRY HUSBANDRY—	
F. S. Jacoby, Asst. Professor of Poultry Husbandry, Ohio State University	345
A COMMERCIAL EGG FARM—	
R. C. Lawry	346
THE ARTIFICIAL REARING OF CHICKS—	
J. C. Graham, Associate Professor of Poultry Husbandry, Massachusetts Agricultural College	351
TRAP NESTS—	
Roy H. Waite, Poultryman, Maryland Agricultural Experiment Station..	355
ROUP IN POULTRY—	
O. V. Brumley, Ohio State University.....	357
MITES AND LICE OF POULTRY—	
J. S. Hine, Professor of Entomology, Ohio State University.....	360
IMPROVEMENT AND CARE OF THE FARM EGG—	
Harry M. Lamon, U. S. Bureau of Animal Industry.....	362
FARM POULTRY HOUSES—	
James G. Halpin, Professor of Poultry Husbandry, Wisconsin Agricultural College	366
SELECTIONS OF LAYING HENS—	
James Dryden, Professor of Poultry Husbandry, Oregon Agricultural Col- lege	368
EDITORIALS	370
DEPARTMENTS	374-384
NEWS NOTES	385-388



WINTER ON THE UNIVERSITY CAMPUS.

THE AGRICULTURAL STUDENT

Vol. XIX.

OHIO STATE UNIVERSITY, COLUMBUS, JANUARY, 1913

Number 5

Poultry Husbandry

F. S. JACOBY

Assistant Professor of Poultry Husbandry, Ohio State University

AMONG the many things which tend to make farming in the Eastern States interesting is the diversity of the farm operations. In the Central West one will find large corn and wheat farms; in the far West, immense cattle ranches, and in the South, cotton and sugar plantations. In the East, however, there is no single predominating type of farming. The farms are comparatively small and the farmer derives his income from many sources. It is not at all uncommon to find dairy cattle, hogs, sheep and poultry on the same farm with corn, wheat, oats, rye and potatoes as the field crops. With this diversity of farm operations one is not surprised that the poultry is often neglected.

The status of poultry on the farm depends largely upon the viewpoint of the farmer. In every rural community one will find farmers whose opinions about poultry keeping are radically different. One farmer believes that poultry is a necessary nuisance and he gives it the care and attention that he feels it deserves. Often his wife must care for the fowls and she does so with no encouragement from her husband. A second farmer realizes that his poultry is profitable, but being somewhat adverse to caring for it himself, he turns it over to his wife, but aids her in many ways, such as providing a sanitary poultry house and keeping it clean. A third farmer has experienced the

conditions described above. When he perceived that his wife was buying the groceries and clothing the children on the income from the poultry, he realized that poultry was a branch of live stock production worthy of a MAN'S attention. On his farm, a flock of pure-bred fowls are housed in sanitary pens and given the same care and attention accorded the other farm animals.

In Ohio, ninety-three per cent of the farms derive some income from poultry. This income may appear too small to be worthy of serious consideration. However, if the housewife is deprived of this income, the farmer soon notes the effect upon his purse. Many a country boy has been clothed and sent to school by means of the income from a flock of mongrel hens. Much has been written concerning the profitability of poultry raising, some of which is misleading to the general public. Poultry raising on the farm is as profitable or more so than ever, but whether the profits are large or small depends as much on the MAN as on the fowls.

Notable advances have been made in recent years in all agricultural branches. One that is worthy of consideration is the improvement of the incubator and brooder. These two devices have enabled the farmer to MANAGE the most important steps in poultry production. It has enabled him to increase the size of the farm flock from

a hundred hens to five hundred hens, without further expenditure of labor. With this increase in the size of the flock the farmer is enabled to place his poultry on the same basis with his other farm operations. When this condition becomes general throughout the East and Central West, there will be a more permanent and substantial poultry industry.

It has been conceded by authorities on Agricultural conditions that the American farmer is extremely wasteful. One who has lived in a rural community for any length of time will not doubt this assertion. A common saying which is often repeated is, "A penny saved is a penny earned." The hen on the farm may be characterized as the "penny-saver." Each hen accom-

plishes but a very little by herself, but when scores of her sisters are gathered together, the result is worthy of praise. If the hen is not efficient in production, it may not be entirely her fault. No animal is more economical in the consumption and assimilation of food than the hen. The fault probably lies with the man who does not understand the hen. This understanding can only be attained through education and experience. Poultry husbandry has reached that stage in its development when it must be treated as a science. When this fact is appreciated and farmers are willing to devote the same study and care to their poultry that they now give to other live stock, the Ohio hen will become a larger factor in Ohio Agriculture.

A Commercial Egg Farm

R. C. LAWRY

THE term Commercial Egg Farm is used to define a farm devoted to the raising of hens for the production of eggs to be used for table purposes, or for incubation; or for the production of infertile eggs for table use, from hens produced on the farm or from pullets purchased each Autumn, in contradistinction to a general farm on which eggs are produced, or to the special poultry farm on which poultry and eggs are produced for their exhibition qualities only.

The following article will be devoted to the methods of an Egg Farm which produces its own layers and of such quality that during the months from January until June the majority of the eggs are sold for incubating purposes. Only for the months during which the prices are highest are its eggs sent to market to be used for table purposes.

The Yesterlaid unit method of egg farming is a rational, commercial, and soundly unsentimental method of getting eggs from single comb White Leghorns. It is a method of handling hens which takes cognizance of the necessary losses and small margin of profits that are bound to occur at times in business of this sort and yet so conducts the business that there is a margin of profit.

It is founded on the idea that after a set of fixed costs in the way of executive affairs, offices, buildings, and appliances, necessary for conducting and advertising the enterprise have been gotten together; and this set of fixed costs have been so reduced and controlled that it can successfully handle at a profit three or four units of a thousand hens, additional units can be added at an inverse ratio of proportionate costs. That is, the amount of

over-head fixed costs will operate twenty to one hundred units at an infinitely smaller prorata cost, and do so just as efficiently as they will operate three, five, or eight units.

It is a method of poultry farming founded on sound, scientific facts seasoned and controlled with mature business judgment. In the Yesterlaid unit system of Egg Farming specialization is the watchword. Every man is given a certain kind of work. The feeder always feeds and is not re-

fers the impression he wishes better than to use for an example the method of a tomato grower or a corn farmer. The tomato grower watches his plants for an individual plant that will produce uniform, firm, and evenly ripening tomatoes which he can save for seed. These seed he will plant apart from the general lot, watching their growth and development and their yield of fruit closely. The second generation of seed from the one or several, specially good plants are used for



A "HENDWEL."

quired to wear himself to a point of carelessness by doing other forms of work. The cleaning is done by one set of men, and the incubating by another set. The scheme of management takes into account the fact that in order to successfully operate a farm of this sort there must be a department of pedigreeing for developing and locating individuals having unusual powers of heavy egg production. This breeding flock or department is not greatly different from a seed plot on a corn breeding farm. The writer knows of no way to convey to his read-

producing plants for his entire field or crop another year. Each year this idea is carried out. It is the same with the corn breeder. He has his seed plot in which he tries out the kernels from his most desirable corn plants producing the best ears and when he has raised enough of these good individuals in the seed plot he uses the corn for sowing his general corn field to make his market crop. At Yesterlaid the Pedigree department is the seed plot, the 1000 hen units are the big tomato and corn fields where the market crop is grown. The Yester-

laid Unit System is not built upon ideas that are strictly new or revolutionary in any respect. It is simply a commercializing of the science and practice of poultry raising as it obtains in this country today.

Producing market eggs of superior quality on a large scale is in a way very like other forms of manufacturing. The shoe manufacturer first has in mind a shoe that will be superior in every way to one that is being manufactured. His next step is to put his idea into material form. He then wants to know how cheaply he can possibly produce that shoe without in the least cutting down its quality. If it is to be a successful enterprise he must produce enough of these at a small margin of profit to make the business worth while. In developing Yesterlaid Egg Farm, the line of reasoning and building has been very similar to that of the shoe manufacturer.

How large a flock of hens can we keep together to yield the optimum return to our investment? Where is the point of diminishing returns? These are questions which confronted the Yesterlaid Egg Farms Company when it established its plant at Pacific, Missouri.

The optimum return is represented by the greatest number of eggs that can be had for the least expenditure of labor and feed.

It is quite generally agreed that one of the greatest items of expenditure in operating a poultry farm is for labor. Realizing this, it seemed to the management that if a large commercial poultry farm was to be successfully operated it must be by some system whereby the amount of work done by one man could be greatly increased over what was generally expected as the individual limit.

There are in the United States today, two conventional or standard plans for housing and yarding laying hens, i. e., the continuous, or series house plan with single or double yards, and the colony house plan with restricted or unrestricted range. It is by means of a specially designed house and a combination of these two basic plans for handling hens that this farm has so successfully built up its plant of units of 1000 hens.

Where the flocks are yarded, the labor required in caring for them and in keeping the runs renovated is greater than the average returns will warrant. Where the hens are allowed free range, there is a waste of energy on the part of the hens and loss of life and eggs which make this principle unprofitable.

It was after carefully considering and weighing all of these matters that the management conceived the idea of combining all of the good ideas of the various plans of housing and yarding, and embodying them in a house which would at once be a colony unit with limited range and yet possess all the conveniences of a continuous house. Technically, the key note of the Farm is the 1000 hen unit or the Hendwel.

The Hendwel enables the man-cost per hen of routine work to be so lowered that the earning power of a hen producing 120 to 140 eggs in a flock of 1000 is greater than the earning power of a hen producing 160 to 180 eggs in a small flock of 200, prices remaining the same in each case.

The Hendwel is a complete poultry plant under one roof and on the general farm or the small poultry farm can be operated entirely independently of any other building or appliances and equipment, other than such as can

be housed in its upper and lower hallways.

The Hendwel had its birth in our conception of the effort necessary to the care of a thousand hens, but its relative size and expense can very easily be reduced to accomodate 500 or even 200 hens.

Brooding and Hatching: All hatching is done with Mammoth incubators having a capacity of 14000 eggs. Eggs are put into the machines once a week, so that there is a continuous stream of chicks coming from the incubators during the hatching season.

From the incubator they are taken to a double brooder house two hundred feet long, equipped with a hot water brooding system, which will accomodate twelve thousand chicks at one time. (The brooding equipment will be double this or 25000 for the season of 1913.)

Throughout the incubator and brooder, strict prophylactic measures are observed, so that from the time the eggs are put into the machine, until the chicks are taken to the open range there is not a chance for disease to creep in. The incubator and brooder are arranged so that each compartment can be quickly and easily cleaned and disinfected.

The chicks are allowed to stay in the brooder house until they are thoroughly feather and the sexes separated. In this way every possibility of their becoming chilled while they are of tender age is avoided. They are never allowed to go out of doors until they are taken to the range houses. By having the indoor runways roomy and supplying fresh untrampled greens, in the form of lawn or rye clippings, sturdier more rapid growth is obtained and the mortality greatly decreases.

Range Raised: Yesterlaid Egg Farm

exemplifies the virtue of Range-Raising; the desirability of putting into the growing young animal solid bone and sturdy muscle that can come only from unhampered, spontaneous and instinctive exercise—the exercise of young animals at play.

It has been said that constitutional vigor is nature's stamp of approval placed upon man's effort at animal breeding and improvement. If this be true then surely the range-raised stock on this farm is richly endowed with nature's approval.

When the sexes are separate, the females are taken to the range houses, where they are given range over fields of growing crops, and under the shade of nearby wood pastures.

When the pullets are taken from the brooder house, cockerels are carefully inspected for individuals that give promise of developing into superior breeders. These are taken to a range apart from the pullets; the remaining ones are specially milk fattened and sold as broilers.

On the range the chicks are placed in flocks of one hundred to two hundred and fifty in each range house.

They are allowed to run in small temporary yards for a few days until they learn to go in and out of the house; after this they range at will over the fields.

When their combs begin to redden and develop, the pullets are taken to the Hendwels and placed in flocks of five hundred where they are fed for early and continuous egg production.

The Layers: All laying females, except the trap nested breeders, are housed in Hendwels. These houses are large, airy, light places, where the hens roost and lay. The exercise rooms are thirty feet square and have cement floors which are littered with wheat

straw. These rooms afford an idéal place for the hens to collect and scratch during the days that it is unpleasant for them to be out of doors. They roost and lay five hundred in a flock, and range in large pastures, or fields of several acres, in flocks of from two thousand to three thousand.

The ground food, water and shells are supplied automatically, and the grain is fed by hand. The attendants are trained to think in terms of comfort for the hens, and are not required to wear themselves to a point of carelessness by having to carry large buckets of feed. Each Hendwel has its own feed bins, which are refilled as often as necessary by wagon, generally once a month. The attendant has to carry only an egg basket.

Weather conditions are such that there is scarcely a day throughout the

year when the hens cannot be out of doors, thus insuring strong fertile eggs. Although very nearly 75,000 eggs for hatching were selected from these large flock collections during the spring of 1911 and 1912 few instances of low fertility or unsatisfactory hatching power was reported. By test the fertility averaged above 95 per cent.

Records: A complete system of records of each day's work, showing feed used, eggs produced, hatches taken off, stock sold or moved comes into the manager's office at the end of the day. Instructions are issued to the superintendent who has charge of all outside work. Sometime during each day, the manager goes over the entire place taking careful notes of anything that might escape the notice of the attendants or the superintendent so that a double check is at all times kept on the work at hand.





THE ARTIFICIAL REARING OF CHICKS

J. C. GRAHAM

Associate Professor of Poultry Husbandry, Mass. Agr. College

CARING for chicks the first few weeks of their existence is of very great importance. It is a well known fact among poultry men that if they are stunted during this period in any way they never fully recover. They should be started right and kept growing to maturity without any setback if size, vigor and early maturity are desired.

The proper temperature, an abundance of fresh air, plenty of exercise and good methods of feeding are four fundamental principles to be observed in raising chicks. Brooders and brooder houses should be well ventilated. Small chicks are sometimes killed by being obliged to breathe fumes from the lamp. If indoor brooders are used, the fumes should be piped to the outside.

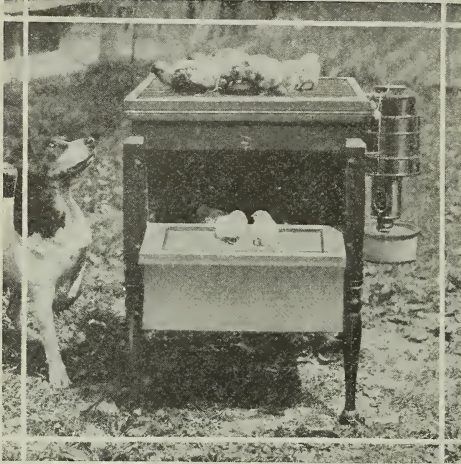
Feed should be wholesome, clean, easily digested and palatable. Much of it should be fed in such a manner

as to induce exercise. These are five important points that should not be overlooked. Be sure all the feed used is fresh. Avoid any that is musty, moldy or stale. By feeding the mash in small troughs or dishes that can be removed and cleaned when the chicks have finished, filth and disease germs can be avoided. Coarse, fibrous, indigestible materials should not be fed. Many chicks have been killed by eating pieces of corn stalks, large quantities of dry grass, etc. Millet seed is hard to digest, as it is covered with a very hard fibrous coat; yet we find it in large quantities in some brands of commercial chick feed. Those that contain a large percentage of this should be avoided the first few weeks.

The following method of feeding chicks has given the writer good results and is now being used at the College plant.

The brooder is disinfected and prepared for the chicks the day before they are placed in it. One or two inches of sand are placed upon the floor and about the same amount of chaff or fine litter. The temperature under the hover depends upon the distance of the bulb of the thermometer from the floor. In some it is kept at 110° and in others about 95°. The question of temperature causes more deaths among chicks than any other

one thing. If the thermometer is to be kept at 95° , litter should be heaped up under the hover till it is within about two inches of the thermometer. In other words, the floor under the hover should be about 90° for the first



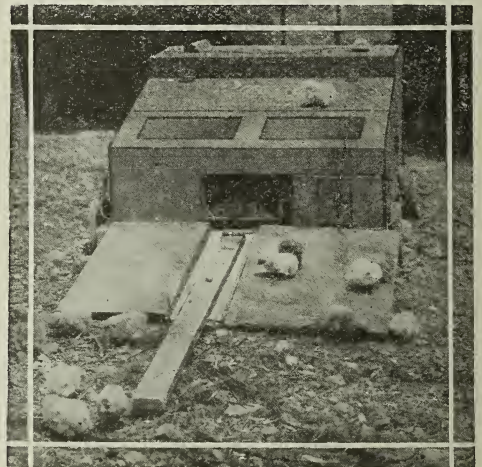
“NEW ARRIVALS.”

week and gradually decreased to about 70° when the chicks are about four or five weeks old. Heat will not be needed after the sixth or seventh week in warm weather. In caring for chicks, we should use our hands as well as our heads. Not long ago, the writer saw a brooder of chicks that was being cared for by a very conscientious young man; according to directions the temperature was exactly 95° but when the hand was placed on the floor under the hover, it was found to be perfectly cold. No wonder the chicks huddled in a corner outside the hover.

The actions of the chicks are an index to heat conditions. If they huddle under the hover, they are too cold. If they pant and work their way out from under it, they are too warm; but if they are spread out under the hover with a few heads peeping out and appear comfortable, the heat is about right. The best results are obtained

when not more than forty or fifty chicks are kept in a hover.

Much can be learned about brooding by watching the mother hen. It is noticed by close observation that she hovers the chicks very closely the first day. They come out only occasionally to eat. The second day they are not hovered so closely but are out from under her quite often, running about a little. On the third day they are out most of the time, going back occasionally to the hen for warmth. If people running brooders would only adopt this system of the mother hen, they would not have such heavy losses. If possible the chicks should be gotten out on the ground the third day. It is a well known fact that it is very hard indeed to raise brooder chicks without leg weakness when they are kept closely confined in a warm dry brooder. It is therefore absolutely essential to get the chicks out on the damp moist



“THEIR FIRST HOME.”

ground just as soon as possible to avoid this so-called leg weakness that is so prevalent among little chicks.

About 12 hours after the hatch is over the chicks are taken to the brooder and kept there with fresh

water and grit before them for 24 hours before feeding. For the first two or three days they are fed chick feed, then they are fed bread crumbs and a wet mash, each once a day. The mash is composed of 1 part each (by measure) of wheat bran, corn meal, sifted ground oats, (the finer portion) wheat middlings, and $\frac{1}{4}$ part of good beef scrap moistened with buttermilk or sour milk. A little charcoal and ground bone are added for the first few days. This mash is fed in a crumbly state. For the first two weeks we feed as follows: At 8 a. m., bread crumbs; 11:30 a. m., chick feed; 3 p. m., the above wet mash; 6 p. m., chick feed. Enough chick feed is given at night so that they will have enough left in the litter to keep them busy till 8 o'clock next morning. If they are fed only what they will eat at night, they are fed chick feed at day light in the morning. After the chicks have been sitting under the hover all night we like to have them get out early and work for their breakfast. The bone meal which is given to strengthen the frame is omitted after the first week. Only a little is given, as too much may affect the bowels. Grit is kept in the litter from the beginning.

There are as many methods of feeding baby chicks as there are poultrymen. Bread soaked in milk and soaked in milk and squeezed makes a very good mash. Some get good results by feeding nothing but chick feed. Others start them out on bread or cracker crumbs and johnny cake. The infertile eggs are sometimes fed raw by mixing them with oatmeal and bran. This should not be done unless we are sure they are from good healthy stock. Usually they are boiled hard, chopped up shell and all, and mixed with ground grains. It is not so much what

we feed, but how we feed it. I like the method we are following because it brings them along fast.

After the first two weeks if we haven't plenty of bread crumbs we feed the wet mash twice daily. In other respects the feeding is the same as the first two weeks except a little cracked corn, hulled oats, and wheat are mixed with the chick feed.

When the chicks are six weeks old the wet mash is displaced by a dry mash and the chick feed is gradually displaced by cracked corn and wheat. The dry mash is composed of the following by weight:

Mash 1. 2 parts wheat bran, 1 part wheat middlings, 1 part corn meal, 1 part alfalfa (ground), $\frac{1}{2}$ part beef scrap, $\frac{1}{2}$ part oil meal, $\frac{1}{2}$ part gluten meal.

Mash 2. 1 part wheat bran, 1 part wheat middlings, 1 part corn meal, 1 part finely ground oats, 1 part alfalfa (ground), 1 part beef scrap.

There is very little difference in the nutritive ratio of these mashes. Use the one that can be more easily obtained.

If the chicks have free range, the alfalfa and one-half to three-fourths of the beef scrap should be omitted, as they can get plenty of green feed; and bugs and worms will take the place of beef scrap.

During long, dry seasons such as we had last summer, a part of the alfalfa and most of the beef scrap should be added as bugs and worms are not so plentiful during such periods. The mash should be kept before the birds constantly in hoppers and cracked corn and wheat fed night and morning. They should be given what grain they will eat, but no more. If it is left before them, they will not forage as much as they should.

Skim milk is a very good feed for chicks. This can be placed before them to drink or be used to moisten the mash. Beef scrap and oil meal should be omitted when skim milk is used. In whatever manner wet mash and milk are fed, only what will be eaten in a few moments should be given at a time, and the vessels in which they are fed kept clean. Scalding water used on them every few days does a good deal toward keeping down disease germs. The reason for feeding dry, instead of wet mash, is because it requires less work, is more sanitary, and the chicks are not so apt to overeat.

When the chicks are ten or twelve weeks old, the pullets and cockerels should be separated, the former being placed on the range and fed the above ration, and the latter confined in small coops for fattening. The cockerels that are to be kept for breeders should be placed on the range by themselves and fed the same ration as pullets.

If it is desirable to keep the cockerels for roasters, they can be left on the range till they weigh from four to five pounds, or just before the flesh begins to harden. They should then be placed in the fattening pens for ten to twenty days before selling.

In fattening birds, it is desirable to have the feed palatable so they will eat a great deal. Equal parts of corn meal, wheat middlings and finely ground oats mixed with milk makes a very good fattening ration. They should be fed all they will eat of this three times a day and just before going to roost should be given a little cracked corn. Some poultrymen get good results in fattening by keeping beef scrap and cracked corn constantly before the birds.

Green feed is necessary for chicks and should be fed after the third day. Lettuce is one of the best green feeds. It can be hung up by the roots for them to pick, or it may be cut in small pieces with shears. It is advisable at times to cut and mix it with the mash for the first few days. Lawn clippings, green clover, alfalfa and dandelions may be fed in the same way. Cabbage, beets and mangles can be chopped fine and mixed with the mash at first, but care must be taken not to feed too much. Two or three small pieces for each chick is enough for the first time. When the chicks are about three weeks old these vegetables can be split open and hung up for them to pick.

It may seem quite a chore for some to prepare green feed in this manner, but it may mean dollars to them in the end. It is not fed so much for its nutritive value as for its action on the bowels and system in general.

Good judgment must be exercised in caring for young chicks. If they appear hungry and eat well you will know they are all right. If any mope about and do not come for their feed, something is wrong, and the cause should be discovered as soon as possible.

After they have gone under the hover at night, feel of their crops to see if they are full. If they are not, it is evident that the chicks are out of condition.

The droppings should be watched carefully. If the bowels are loose, the soft feed should be shut off and the hard grains fed sparingly.

One expert poultryman has said that in feeding chicks more judgment than feed should be used. This is good advice.

Trap Nests

ROY H. WAITE

Poultryman, Maryland Agricultural Experiment Station

FROM my experiences in carrying sample trap nest around with an exhibit, I find that a trap nest is a novelty among the great mass of people, although they have been in use for a number of years and a patent has been taken out on almost every conceivable form.

Uses of Trap Nests.

The most important use for the trap nest is for the breeder to get an exact line on the parentage of his birds. He mates up several females with a male

to whether or not any good may come from this method of breeding. It is practically concluded that the continued breeding from high producers does no good. Probably it will be found that it is necessary to breed from birds (both male and female) that have the ability to produce high laying pullets rather than from the high laying hen herself. If this should prove true, trap nests will be indispensable to the breeder of high laying stock.



SHOWING OPERATION OF TRAP NEST.

Hen is seen entering; one is ready to be taken out; three nests are occupied and one is open.

and the only way that he is able to distinguish each hen's eggs is by means of trap nests unless the eggs show enough individuality, 'as sometimes happens, for him to determine by color or shape of the eggs. For this purpose it needs only to be used during the breeding season while the eggs are being saved for hatching.

Sometimes yearly egg records are kept so that the high producers during their pullet year may be used as breeders. Authorities are still undecided as

The trap nest is also used, sometimes, during the early months of winter to pick out the nonlayers so that they may be disposed of. There are other methods almost as efficient and which are less bother. An examination of the bird's body, comb, and her general condition together with the spread of her pelvic bones will tell the observing man whether she is laying or not. A few weekly or monthly examinations of the flock, for these points, will tell him which to throw out.

Disadvantages of the Trap Nest.

The disadvantages of the trap nest are many. A large amount of time and attention is required to look after them. If yearly records are kept it is necessary to make the rounds of the nests several times a day, three hundred and sixty-five days in the year. Hens know no holidays and it is just as necessary to attend them Christmas, New Year's, or Fourth of July as any other day.

There is always a great number of eggs laid that are not identified because they are laid on the floor, the failure of the nest to work, the hen getting away before the band number could be read, or two or more hens laid in the same nests. In cases of this kind the exact object is thwarted and if the unidentified eggs are at all numerous little is known about the apparently poor layers, for they may have laid a large part of this number.

Hens are often killed in trap nests unless very carefully handled. The hot weather of summer is exceptionally bad. Some naturally restless and nervous ones will work so hard to get out after laying that they become exhausted and die in the close quarters of a small nest in extremely hot weather. In this kind of weather, the trap nest cannot help but have a detrimental effect on egg production.

Forms of Trap Nests.

There are numerous forms of trap nests used. A number invented by experiment stations and colleges, and not patented, can be made at home by anyone handy with tools. The Connecti-

cut trap nest is said to be very good and is one of the very latest. It has been described in several poultry papers and a drawing is given in Circular No. 37, of the Purdue University. The Cornell University trap nest is very simple and is largely used. Its main disadvantages are that it is rather hard on the birds and fails to work unless the adjustment is absolute. The old Maine Station trap nest with the round hole and wire trigger is not used so much now as formerly, as it is cumbersome and not as efficient as it should be. The new style Maine nest is said to work very well. Its principle is a treadle which raises the door as the hen steps upon it. Another style nest allows the hen to go to another pen after laying thus segregating the layers. With this system much of the labor is eliminated and the birds are not injured, but it is very inaccurate for a bird is not compelled to deposit an egg in order to get through the nest.

There are numerous patent recording nests on the market. One works with rings which are taken off the door by the bird as she leaves the nest and remains on her neck until removed by the attendant who then makes a record of the laying. This also is inaccurate as the non-layers need only to occupy the nest in order to get the ring about the neck. Another nest is so constructed that a chalk mark is made as the hen leaves the nest. Different colored chalk indicates the bird which did the laying.

Numerous other nests are used, but the one satisfactory in all details is yet to be made.

Roup in Poultry

O. V. BRUMLEY
Ohio State University

CORYZA AVIUM CONTAGIOSA, commonly known as Roup in poultry, has been written up in the various poultry journals more than all the other diseases of poultry, and right well that it should, for this disease causes an enormous loss every year to the poultry industry. After considerable experimental work carried on for the past three years we are prepared to offer some new facts concerning this disease which have heretofore been overlooked, especially in regard to its cause and different methods of prevention and treatment. Its prevalence and general appearances are quite well understood by the poultrymen, and has been thoroughly discussed and written up in the different journals. However, it might be well to mention that the various adverse conditions under which birds are kept, such as being housed in filthy, poorly ventilated places, or exposed to cold, cold draughts of air and dampness in various ways, will not cause this disease directly, although they have been considered by most poultrymen as the most common causative factors. Colds may be produced by these conditions, but colds are not roup, as the infective organism must be present before a healthy bird will become affected with the disease. However, it is well to consider that when birds are subjected to unsanitary conditions and exposure, their vitality or more properly their resistance to any infectious disease, is more or less reduced and when the opportunity occurs, i. e., when

they come in contact with the germs through the various carrying agencies, they will contract the disease more readily. It has been observed quite frequently that birds kept under the very best sanitary conditions will contract the diseases, but not so readily nor in so severe a form as those kept under adverse conditions. This is further evidence showing the infectious nature of the disease. This resistance to disease varies in individual birds of a flock as well as in different flocks, and possibly in different breeds, and it is due to this individual variation that some birds have the disease in a more severe form than others even in the same flock.

The spread of the disease is brought about through numerous agencies. One of the common sources of infection is at the various poultry shows where the birds are in nearly every case associated with roup affected birds, or forced to breathe air contaminated with the germs, and be handled by someone who a few minutes before had handled a sick bird; these usually develop the disease in a few days after returning home and likewise spread it to the entire flock; or it is often carried from place to place by sparrows and pigeons feeding in roup affected yards. It may also be carried on clothing, straw, etc. In some instances it is quite difficult to determine accurately how the disease is spread, but if the investigation is carried out thoroughly, it will be found that the birds have contracted it by some intermediate carrier. The period of incubation varies somewhat, usually in ten days to three weeks the more susceptible birds of the flock begin to

(Infectious Nasal Catarrh; Canker; Chicken pox; Coryza Avium Contagiosa; Diphtheria).

show the disease, later more of them show it, some die, others slightly affected do not eat good and are droopy. The majority of the latter will improve some, but will not entirely recover for a long time, their appetite being only fair, and they will not lay when in this condition. A large number of those having a more severe form of the disease will often partly recover by careful treatment with various antiseptic solutions, but it takes a long time, is a tedious process, and is discouraging even to the most enthusiastic fancier, and the birds are of little value afterward, as they rarely regain their former condition. It is this feature of the disease that occasions more loss than the birds that die, for they are unfit for exhibition or sale, and do not produce eggs.

In numerous instances it has been observed that poultrymen do not always have a clear conception of the disease, therefore, a number of names have been used, such as cold in the head, canker, chicken pox, etc., which represent the same disease. This disease assumes different forms, depending upon the different tissues affected. If in the mouth and eyes where the mucous membranes are always moist and soft, it at first appears as a thin discharge, which soon becomes tenacious, and later yellow deposits are formed varying in size from a pin head to masses involving the entire mucous membrane. This form is commonly known as canker or sore mouth, and when the eyes are the seat of infection the entire eye ball is often destroyed. The upper air passages (nasal passages, larynx, trachea) may be likewise affected and completely closed, and often the infraorbital sinuses are distended on either side with the same yellowish material. When the disease

extends to the trachea and bronchial tubes, the deposits form on the mucous membrane, which often seriously interferes with respiration, causing the bird to emit a peculiar wheezing noise. Occasionally a bird will die suddenly, or in a few hours from suffocation, due to a gradual increase of the deposit in the air passages. On the dry skin surfaces the lesions appear as a small red spot over which soon forms a dark scab. This forms the so-called chicken pox. When a single large spot occurs it is often mistaken for a pick-inflicted wound, but it will soon be noticed that it does not heal as readily as an ordinary wound. Large numbers of these wounds are often observed on the same bird, and may extend over the entire body. The digestive tract often becomes more or less involved from the constant swallowing of the infective material from the mouth, which may account in part for their loss of appetite and emaciation. Therefore, when these symptoms appear in a few birds and rapidly spreading to others, and have the deposits in the mouth and the peculiar characteristic odor, one is safe in calling it roup. Experiments have proven quite conclusively that so-called chicken pox, canker and diphtheria are all one and the same thing, and in the prevention and treatment they must be considered as such.

In order to avoid loss from this disease, prevention is needed more than a cure, and there are several ways in which this might be accomplished. In the first place, care should be taken in adding birds to the flock to see that they are free from the disease. It is best to keep recently acquired birds, or those returning from poultry shows, in quarantine for at least ten days before they are allowed to run with the

regular flock. This often will prevent the disease spreading through the entire flock. Secondly, birds should be supplied with a clean dry place, as free as possible from dampness and exposure, and plenty of sunshine. Thirdly, the houses should be thoroughly cleaned and disinfected frequently to destroy infection and parasites of all kinds which might reduce the general vitality of the birds and allow the regular infection to gain entrance. Any of the common disinfectants may be employed, such as lime solution to which has been added 5 per cent. carbolic acid solution. Fourthly, the vaccination method is to be highly recommended as one of the most satisfactory methods of preventing the disease. This method is being used with excellent results at present on the Ohio State University flock. This treatment consists in injecting under the skin with a hypodermic syringe a vaccine made from a pure culture of the organism obtained from the discharges and deposits of diseased birds. This vaccine when injected will increase the birds resistance to this particular disease. The period of immunity will probably last for a year or eighteen months. This period is very satisfactory, especially for immunizing birds for show purposes. In treating birds after they have once contracted the disease presents some difficulties, and poultrymen often become discouraged, especially when large numbers become affected.

In the first place all birds showing the initial symptoms should be isolated from the regular flock, have a separate attendant, and all utensils used for the sick birds should not be used for the regular flock. The object being to prevent as far as possible the spread of the disease among the healthy birds.

Secondly, thorough disinfection should be carried out in all the houses. Thirdly, in order to keep up the normal resistance of the birds to infection, plenty of good nutritious food should be given, and some general tonic used in the drinking water. Sulphate of iron, using one teaspoonful to one gallon of water is probably the most satisfactory for general use. Avoid the use of the various condition powders for this purpose unless their ingredients are known. Fourthly, the sick birds may be treated individually by using antiseptic solutions applied directly to the diseased surface. Potassium permanganate in a one per cent solution, or boric acid two per cent. solution in water are the most efficient ones for this purpose. When the deposits are extensive it is advisable to remove them by scraping them off the membrane by the use of a dull knife or curette. This will allow the antiseptic solution to come in more direct contact with the seat of infection. Should abscesses develop, or the infraorbital fossae become distended with pus, a free incision should be made in either case, the pus removed and the cavity washed thoroughly with the antiseptic solution. Fifthly, the vaccine treatment is also to be highly recommended as a curative agent, especially in cases where secondary infection has not greatly reduced the general condition of the birds. The injections are made in the same manner as for the preventative treatment, except that in the more severe cases a second or third injection every four days is occasionally necessary before all of the lesions disappear. This will be the ideal treatment as soon as the vaccine can be made and distributed at a low enough price to warrant its use on the average flock.

Mites and Lice of Poultry

J. S. HINE

Professor of Entomology, Ohio State University

TWO groups of species are external parasites of poultry, namely: mites and lice.

Mites, when mature, have eight legs, puncturing and sucking mouth parts, and belong to the same class of animals as spiders. A southern species, on account of its size, is called the chicken tick. Two small species, common in this section, are called the chicken mite and itch mite, respectively. The latter is the cause of scaly-leg, so commonly troublesome in neglected flocks.

The chicken tick abounds in Texas, New Mexico, Arizona, and Southern California. It sucks blood from hens at night and retires into crevices to pass the day. Eggs are laid in manure and filth about the roosts. Since the adult is a third of an inch in length its size easily distinguishes it.

The chicken mite is widely distributed and is an important pest when present in numbers. It is nocturnal in its feeding habits and the day is spent with its associates in retirement on the under side of the roosts, quite commonly at the junction of these and their supports. In extreme cases of infestation, clusters of these mites contain hundreds or even thousands of specimens. Eggs are laid in the same situation as with the chicken tick. The young feed largely upon filth for a time and then attack chickens, feeding for the remainder of their lives upon blood.

Both the chicken tick and mite are easily controlled, since they remain about the roosts during the day. Give the house a thorough cleaning and treat the roosts and other places that would harbor the pests with kerosene. In case a single treatment is not consid-

ered sufficient a second may be given in ten days or two weeks. Since eggs are resistant to most substances, two treatments with an interval of ten days between is likely to be fully satisfactory. The first treatment kills the pests but not the eggs, while the second kills the young that hatch from these eggs before they are old enough to produce eggs themselves.

Scaly-leg, the result of the work of the itch-mite, may be cured easily by treating the affected parts with kerosene. One or two applications will suffice usually, but time is required for repair in severe cases. Frequently this appears to be a slow process even after the cause is removed.

The biting lice have six legs, biting mouth parts and are true insects. They feed on scales and parts of feathers, which are of no particular use to the birds, but by running over the body of the fowl and scratching and pricking with their sharp claws and spines, they produce nervousness, which often results in general debility, a condition during which many of the various diseases are likely to be contracted.

A dozen or more forms of these lice infest the various domesticated birds, each kind of which has one or more species peculiar to it. Lice of ducks are not found on chickens, naturally, and the lice of chickens are not injurious to ducks and pigeons, so it is very unusual for one kind of fowl to become infested from another kind that may be housed near by.

Two types, the running and the clinging lice, are recognized. The former are most injurious, for they run over the skin of all parts of the body; the

latter simply cling to the feathers and only move occasionally, and then very slowly.

The control of these insects is more difficult than in case of the mites. Many methods have been suggested and most poultrymen use treatments that suit their own condition best. For this reason the mention of one or two remedies here is all that will be attempted.

The dust wallow and sunshine are nature's methods. Powdered sulphur rubbed in among the feathers gives satisfaction according to the experience of some people.

Tobacco infusion, or strong soapsuds to which some kerosene is added, has been used with favorable results. Fowls are dipped or washed in these substances, in which case care should be used to prevent colds.

Since the running lice do not remain on the fowls all the time, but are to be found on the roosts, among material used for nests and in other places about the houses, even in other buildings, cleanliness is an important consideration. In cases of extreme infestation this matter should receive much attention. Banks gives the following: "Dissolve in kerosene all the flake naphthaline it will take, and paint the roosts and nests with this saturated solution every week or so for a few months. Sawdust wet with this liquid may be placed in the nests, but should be put beneath the straw so that the eggs will not rest upon it."

Whatever methods are selected, they should be used with a certain amount of determination in order to accomplish desired results.



FEEDING THE BEAUTIES.

Improvement and Care of the Farm Egg

HARRY M. LAMON
U. S. Bureau of Animal Industry

THE great egg and poultry producing territories of the United States can be divided according to the geographical location and the character of the industry into three quite distinct sections. The first of these comprises the northeastern states, including New England, New York, Pennsylvania, New Jersey, and Maryland. This is a section in which the poultry industry is one of importance and where many large and specialized poultry farms are located. Inasmuch as it also happens to be the greatest consuming section of poultry products, the local production of eggs does not supply the demand, and large quantities are brought in from other parts of the country. The proximity of the poultry farms of this section to the large markets enables the poultrymen to dispose of their products readily, and it is natural that they should cater to the discriminating trade demanding a fine quality of fresh eggs. The whole tendency, therefore, is for the eggs to be shipped in small lots by express or fast freight, so as to reach the market in a short time after they are produced. These are consumed in a relatively brief time, and comparatively few eggs in this section find their way into cold storage.

The second egg-producing section comprises the states bordering the Pacific. Here the conditions are in many respects identical with those of the first section. The eggs produced all find a market in the cities of those states and the quantity is not sufficient to supply the demand. Here, also, many large poultry farms are located.

The third section comprises principally states lying in the Mississippi Val-

ley. It is in this great section that the vast majority of the eggs of the country are produced. Yet the character of the poultry keeping is quite different from that in the other two sections discussed. There are in this whole stretch of country few farms which can be termed "poultry farms" or where poultry raising can be considered to be one of the main branches of the farm work. The great bulk of the eggs is the product of the flocks of hens which are kept on practically every general farm throughout the whole area. These farms are devoted mainly to grain growing and live stock, principally cattle and hogs, so that the poultry kept is incidental, and the eggs produced are really in the nature of a by-product of the farm.

Not much systematic care is given to the hens on the farms, and, as a result, the great majority of the eggs come in the spring and summer. Also, this section is not one of heavy consumption, and in consequence, during the summer and spring, many more eggs are produced than are needed locally. Only a few years ago this great surplus production resulted in such a glut and lowering of prices that in many instances it did not pay to take the eggs to town during the spring and summer, while in the fall and winter eggs were scarce and very high. With the cold storage of eggs the conditions have changed. During the spring, when production is heavy, the eggs are brought up and placed in storage, to be taken out when the period of scarcity comes in the fall and winter. As a result of storage, there has been a greater equalization of supply and de-

mand throughout the year, and, what is of most importance to the farmer, the majority of whose eggs are produced in the spring, a maintenance of prices during that period much above what they were before the days of storage.

Loss Due to Faulty Methods.

In spite of the fact, that prices are better than they were formerly, the producers are not receiving as much for their eggs as they should, considering the ultimate prices paid by the consumers of these eggs. This is not the

result of this loss, prices paid to producers must be depressed to cover it, and this accounts for the difference between the prices paid for these eggs and the prices charged the consumers.

At first glance it might be thought that this loss and deterioration was slight and of minor importance. Quite the contrary, however, is the case. From a careful study made of the situation, it appears that the annual loss resulting from these sources in the egg trade of the country totals about 15 per cent., of the value of the product,



LACK OF UNIFORMITY IN SIZE PREVENTS THE SECURING OF HIGHEST PRICES.

result of any combination on the part of the buyers to keep prices down, for competition is usually sharp enough to cause as much to be paid as the buyers can afford. The real reason lies in the fact that the system of marketing and buying eggs in this section is faulty and causes a good deal of preventable loss and deterioration. This is mainly because no incentive is offered for care and expeditious handling of the product. In other words, the careful farmer who markets good eggs, as a rule gets no more for them than his careless neighbor who markets poor ones. As a

or \$45,000,000. In the State of Kansas alone, where the investigations of the Department have been principally carried on, the annual loss is estimated at more than \$1,000,000.

The Common Method of Marketing Eggs in the Middle West:

To explain the reason for this loss and deterioration it is necessary to outline briefly the usual method of marketing eggs in this section.

The eggs, as previously stated, are produced on the general farm. The income from these is considerable and very welcome, but is, after all, inciden-

tal. The care and attention given the fowls and the products, are therefore usually incidental also. The farmer gathers the eggs whenever convenient; sometimes each day, sometimes two or three times a week. The eggs are brought to the house and kept until there is a sufficient number to take to the village, or until the farmer makes a trip to the village for some other purpose and takes the eggs along. No particular attention is given to the conditions under which the eggs are kept in the meantime. They may be kept in a pantry or cupboard of the kitchen, where the temperature is comparatively high and where the eggs are bound to undergo considerable deterioration in quality or to reach a more or less advanced stage of actual spoiling. Even in those cases where the importance of low temperature is realized and an effort made to secure this by placing the eggs in a cellar, there is a likelihood that the cellar may be damp, and the eggs in consequence become moldy. Likewise, no particular effort is made to obtain clean eggs by proper attention to the nests and by frequent gathering, or to separate the clean from the soiled eggs when taking them to market.

As a result the farmer may start to town with a basket of eggs, part of which are fresh and wholesome, part of them dirty or smeared and part of them shrunk or stale, or even wholly spoiled. During the drive to town, it is a common occurrence for the eggs to be exposed to the direct rays of the sun for an hour or two and subjected therefore to a temperature greater than the normal temperature of incubation, 103 degrees F. These eggs the farmer takes to the village store and receives for them a certain price per dozen, which is usually given in trade. The

village storekeeper is not a dealer in eggs from choice but rather because he feels it necessary to take the eggs in order to keep the trade of the farmer. If he does not take the eggs he fears that the farmer will offer them to one of his competitors and will in consequence be likely to give that competitor the bulk of his trade. For the same reason, the merchant believes that he must accept the eggs as they run—good or bad, fresh or stale, clean or dirty—for if he does not his competitors will. This system of buying by the storekeeper is known as the case-count system

The merchant holds the eggs until he has enough to make a shipment to some egg dealer or shipper from whom he gets regular quotations. The delay here may be anywhere from two days to a week or even two weeks. Usually the conditions attendant upon the shipment of these eggs up to the time they reach the packing-house are such as to cause a still further deterioration in the eggs. After they reach the packing-house they are assembled in great enough numbers so that more attention and care is given their handling, and although the eggs go through one or more sets of hands from this point before they are placed in storage or reach the consumer, the deterioration which they undergo is not so great proportionately.

Delay in Moving Eggs.

It will be observed that the one unfavorable factor which stands out most prominently in this system of marketing is the delay in moving the eggs. There is delay in gathering the eggs, delay in taking them to town, and delay on the part of the storekeeper. When these delays are coincident with high temperature, serious loss and deterioration result. This is evidenced

by the poor quality of summer eggs.

The spoiled and deteriorated eggs compose several well-recognized classes, most common among which are the following: Heated eggs, those caused by the development of the embryo in fertile eggs; shrunken eggs, those in which a part of the water has evaporated from the white, causing a large air cell; rots, those which are totally spoiled; spots, those with localized areas of bacterial or mold infection; dirty eggs, those soiled with mud, droppings, or the contents of broken eggs; and checks, those slightly cracked.

While there is some deliberate delay in the fall, caused by the farmers holding their eggs on a rising market, the majority of the delays are due simply to indifference and consequently are preventable. The country stores are directly responsible for the delay, because of the case-count system of buying which they employ. This system has nothing to recommend it aside from the fact that it is a little less trouble to the storekeeper. On the

other hand, it encourages carelessness and delay on the part of the farmer, because it inflicts no penalty for poor or bad eggs. It has even bred in some farmers (who would not expect to sell damaged vegetables or grain for full value) a feeling that an injustice is being worked on them if a buyer candles the eggs and refuses to pay for those which are rotten.

As a result, therefore, of the delays and carelessness, coupled with high temperatures, there is in connection with the handling and marketing of eggs in the Middle West, a great loss, which because preventable in a great measure, is a wanton waste. This loss is borne both by the producer and consumer, but falls mainly on the former. The consumer suffers in being unable to secure good palatable eggs in sufficient quantity, and in consequence, there is a curtailment of consumption. It is only fair to state, also, that these inferior eggs which find their way to the tables of city consumers are often mistaken for a cold-storage product, and the storage industry is thus unjustly discredited.



Farm Poultry Houses

JAMES G. HALPIN

Professor of Poultry Husbandry, Wisconsin Agricultural College

WHEN one starts out to build a poultry house for the farm he should bear in mind that the appearance of the house makes little, if any, difference to the hen. A hen will lay just as well in a house that is unpainted, with the walls out of plumb and everything looking very untidy, be just as happy and healthy as though the house was painted and fixed up with fancy ornaments etc. What the hen demands in the house is that it shall keep her comfortable, and in order to be comfortable it must furnish the following essentials at least.

The house must be built so that it will be dry at all times. In order to be dry it must have a good tight roof which keeps out rains and melting snows. The walls must be proof against driving storms and the floor must be sufficiently high above the natural surface of the ground so that water from melting snows and heavy rains never runs in on the floor. One of the most common faults of our poultry houses is the fact that in the majority of cases the floor of the house is too near the natural surface of the ground, and, in fact, in many instances the floor of the house is below the natural level, especially in those houses that have dirt floors. In houses of this type it is customary on many farms to remove the accumulated droppings from the house occasionally, and in so doing remove some of the dirt floor until the floor of the house is scraped out below the natural level. In most locations the floor should be filled up so that it is from six inches to a foot at least above the natural level of the ground. In order to be dry the house must have

sufficient ventilation to remove the moisture given off from the birds' bodies. The house must be so ventilated that there are no draughts, and in exceptionally long houses a solid cross partition should be built often enough to prevent any possible draughts. Likewise, ordinarily the house should be built solid on the north, east and west, with the south of light construction, thus preventing draughts from the wind blowing crossways through the house.

Also a good poultry house should be as free from sudden changes of temperature as possible. In my estimation a sudden change of temperature from day to night is the principal reason for the absolute failure of the glassfront house. A properly constructed house and properly managed house will be ventilated enough during the day time so that the change of temperature at night will be gradual, and also some pains taken to see that the hens get more protection during the extremely cold weather than during the mild weather in winter. One must remember that the hen only has one suit of clothes and she has to wear this day and night, when the weather is below zero as well as when the weather is above freezing, and that anything we can do to help keep her comfortable during the more severe weather is likely to be to our advantage. However, in the severe weather we must not make the mistake of shutting them in so close as to obstruct the supply of fresh air. Hens must have an abundance of fresh air all the time in order to be healthy. Then, too, a poultry house must be light so that the hens

can see to eat as early in the morning as possible and as late at night as the weather will permit. Probably one of the reasons for the uniform low egg production in the winter is the fact that the days are so short and the nights are so long. The hen has to get a full quota of exercise and feed during the few hours to last her for the entire twenty-four, so that if by cleaning the windows or adding an extra window you can get the hens to get off the roost thirty minutes earlier in the morning and go to feeding, you gain just that much towards the day's work. Tests that I have made with electric lights show very conclusively that egg production can be increased by artificially lighting poultry houses early in the morning in the winter. I do not think that this would be a commercial success, it simply points out the importance of having a house that is well lighted so that the hens will get up as soon as the day light comes. A good manager will of course have feed there in the litter on the floor for the hen to eat as soon as she gets off the roost.

The poultry house must also be reasonably clean. It must be free from vermin, especially from the little mites that suck the blood and cause the great loss in production among our domestic fowls on many farms. The house should also be cleaned frequently so as to keep it sweet and nice. If a poultry house smells so bad that one hates to stay inside, it should immediately occur to the owner that that is a mighty poor place to try to keep profitable stock. If the poultry house is clean enough for a hen it is clean enough for a man to stay in and work without feeling any ill effects. It is a good thing for the poultryman to get down on his knees near the floor once in a while and see how the air

seems down where the hen has to be during the whole day. If the latter is bad it becomes practically impossible for the hen to do well because she is obliged to breathe the impure air which works against rather than for good production. So we should encourage every one to clean the house frequently and use some sort of absorbent material to help keep the house clean and good.

With these general suggestions in mind I think that so far as the average farm is concerned there are a few special things that ought to be especially mentioned as they are not usually given enough attention.

First, I believe that every farmer should have either two poultry houses or else one house divided into two parts so that in the fall of the year the old hens may be kept in one compartment and the pullets in the other. On the average farm the pullets are brought in from the range out of the little coops, trees, and so on, and put in the general poultry house with the old hens. The old hens have been there all summer and they feel that that is their fort and when the young strangers come in they immediately go for them, usually frightening them so that they cease growing and stop developing eggs, and instead of returning profit become a bill of expense for the coming weeks. Also, where a man has two houses or two pens he can, towards the middle of winter select out of those hens that seem to be the best producers, the hens with the best shape and best general character, put them in one pen with the very best of the early hatched pullets and use them as a breeding pen, putting the poorer hens and the poorer pullets over into the other pen, as by that time the pullets will become accustomed to the

house so that the two can be mixed together. With a little selection of this sort a man can make up a breeding pen that is far better than the general run of the stock, and by selecting in this way ought to be able to at least keep up his production and perhaps in some instances improve it.

As our lands get higher and higher in price I expect to see more and more farmers using Portable Colony Houses for handling a large majority of their

flocks. With Portable Colony Houses the farms will need more houses than two and they will begin to rotate their chickens round about the farm just the same as they rotate crops today. I think that our more progressive farmers on our best farms are beginning to realize that the Portable Colony House is going to be the house in the near future, and I expect to see decided changes in poultry house construction within the next few years.

Selections of Laying Hens

JAMES DRYDEN

Professor of Poultry Husbandry, Oregon Agricultural College

THIS subject is probably the most important one in Poultry Husbandry. I wish it were possible to point out some method by which anyone might go into the poultry yard and pick out the hens that have good laying capacity, but at the outset I will say I know of no way that this can be done with any degree of accuracy. You may be able to judge of the dairy cow's productive capacity by noting certain points in conformation or type. Why then, can't it be done with hens? Is there no shape or type that is indicative of laying capacity? But there is a difference. Cows have been bred for a hundred years to a certain type. The individuals in a herd are well known to their owner. He knows from the milk bucket and from the butter test which cows are good producers and which are not, and it has come about in years of breeding that certain types have become established or fixed. With fowls, however, it has not been possible for the owner to know which were the good producers and which were not, and no particular type has been bred to or fixed. I believe it possible by

selecting good layers of certain types and breeding to that type, to establish a strain or breed of fowls of certain type that will be good layers. But whether any shape or type of fowls, as we now have them, indicates their laying qualities is another question. I have trap-nested, during the past ten or twelve years, hundreds of hens and have found good layers of a certain type or shape and poor layers of the same type. I have found good layers with long bodies and good layers with short bodies; I have found poor layers of one breed and poor layers of another. The trouble is, our fowls have not been methodically bred for egg-laying qualities. Some improvement may have been made during the past several centuries, but it has been guess work and slow.

The possibility, however, in the breeding of fowls for productive qualities, I believe to be great. Two or three thousand years ago a certain species of jungle fowl was domesticated. It is said that this wild fowl laid a dozen or two eggs a year. From that fowl our present breeds were descend-

ed. After two or three thousand years of poultry-keeping or poultry-breeding I believe that 25 per cent of the fowls of the country are not laying any more than the original jungle fowls. In every flock of chickens and, they may be pure-bred as we know them, we find a heavy percentage that lay less than 50 eggs during the year. The production varies from half a dozen eggs or even no eggs up to 20 dozen or more in the same breed with the same care and feeding.

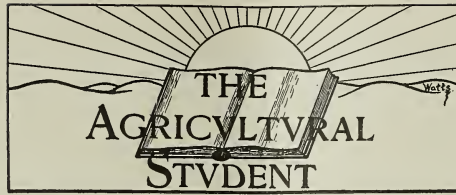
We talk of pure-bred fowls, but where is the purity of breeding where the variation in individuals of the same breed is so great? Speaking plainly, have we any pure-bred chickens when it comes to laying? They may be pure-bred so far as the requirements of the show are concerned. They may breed true to color or size, they may breed true a number of points in the comb or to color of ear lobe, but they do not breed true to number of eggs produced. I am speaking now of the flock of fowls we find on all farms and in all poultry yards. There are no pure-breds when the test of breeding is the egg basket.

It is just as well that we should look the fact squarely in the face. There are great possibilities in breeding for eggs. We are getting to the point in poultry-keeping where we have got to get more eggs if the business is to continue at all profitable. There is getting to be a tremendous production of poultry and eggs but it is useless to advise people to go into the poultry business indiscriminately unless we can hold out more hope for better fowls or a larger egg yield per fowl. The profits in the

future will depend on whether or not we can improve the economic qualities of the fowls. It is not enough to say "buy pure-bred fowls." We have got to buy pure-bred egg-layers if we are going to succeed in the future.

During the past year we have secured at the Oregon Station some very encouraging results from selective breeding. We have secured good layers from good layers and poor layers from poor layers and there is little doubt in my mind that by proper individual selection the egg-laying capacity of our fowls can be greatly increased.

High egg production is no doubt closely related to good digestive capacity and constitutional vigor, but the ability to lay does not depend upon vigor nor on an efficient digestive organization. The ability to lay is a factor of heredity or pedigree; it is transmitted. With that factor absent constitutional vigor will amount to nothing. At the same time without vigor the inherited tendency to lay will be of little value. So that in selecting layers we must select fowls of good vigor, and, if we are to make satisfactory progress in breeding we must select those with a good egg-laying ancestry. This means keeping of individual or trap-nest records. If every state would establish a poultry breeding station and furnish farmers with cockerels and eggs for hatching from high laying strains of fowls, I believe it would soon result in adding millions of dollars to the profits of the egg producers. Shall this be done, or shall we be content to go along as we have been going for the last two thousand years?



OF
OHIO STATE UNIVERSITY.
A Monthly Magazine Devoted to Agricultural Education.

Published by the Students in the College of Agriculture.

Established, 1894.

Subscription Price, One Dollar the Year.

Entered at the Postoffice at Columbus, Ohio, as second-class matter.

STAFF.

O. M. KILE, '12, '13, Editor-in-Chief.
R. W. JORDAN, '14, Assistant Editor.
F. J. SALTER, '13, Art Editor.
J. W. HENCEROTH, '14, Secondary Agr.

Associate Editors:

G. B. Crane, '13. B. A. Schnell, '13.
E. R. Hoftzyer, '15. J. F. Walker, '14.

B. A. WILLIAMS, '13, Business Manager.
A. J. HENDERSON, '14, Asst. Bus. Manager.

Associate Business Managers:

W. Bauchmiller, '14.
W. G. Smith, '14.
F. H. Phillips, '15.
W. G. Spanton, '15.

COLUMBUS, OHIO, JANUARY, 1913.

Editorial

Many factors and agencies have been called into play in order to collect the materials herewith presented.

THE In addition to our contribu-
ISSUE tors whose names appear else-
where, we are particularly in-
debted to The Queen Incubator Co.,
and The Prairie State Incubator Co.,
for illustrative materials so generously
loaned. Our associate, Mr. E. R. Hof-
tyzer, deserves special mention for the
time and energy expended in special
work on this issue.

We hear much nowadays concerning
increased efficiency in the machine
shop and the factory.

INCREASING Thousands of dollars'
FARM worth of machinery,
EFFICIENCY almost new in many
cases, is relegated to
the scrap heap to make room for a
newer type built for greater speed or
operating at lower cost. Expensive

cost systems are installed and high-
priced efficiency experts are employed,
all toward the one end of securing
greater production at lower costs.

**Could we use an efficiency expert
upon the farm?** Are there any wastes of
time, materials or labor upon the farm
which might be prevented or at least
reduced by proper management or im-
proved methods? How about the waste
lands, the unused orchard and barn
lots, the poorly arranged farm build-
ings, the open ditches, the mud roads,
the losses from insects and diseases,
the misused fertilizers, the low crop
yields and all the other thousand and
one losses which occur on the farm?
Are not these the things which cut down
the farm's efficiency and cause it to
rank near the bottom of the scale as a
producing agency? And are these not
these the very places to start improve-
ments in order to secure greater profits
in the end?

Even now there is a strong movement toward the correction of these very deficiencies. Tile drainage was one of the first big steps in this direction and by its adoption the efficiency of many a farm has been doubled and even tripled. The use of horse power machinery was the second big step and is only now coming into some semblance of its full capacity to reduce human labor and enable one man to care for a large acreage. The adoption of the silo is the most recent and perhaps the most spectacular movement of the kind and the amazing rapidity of its progress argues much for the attitude which the farmer of today is taking concerning this question of higher efficiency.

But in spite of the present advances along this line a great multitude of things still remain to be done. In fact, on most farms the surface has scarcely been scratched. There is waste land to be reclaimed, useless orchards to be renovated or cut out and cropped, farm buildings and feed lots to be rearranged so as to avoid unnecessary labor and excessive use of land, better varieties of fruits and grains to be tested out and adopted. The fertility question must be studied for each individual farm. The farm rotation must be modified or supplemented in such a way as to help solve the seasonal labor problem.

Withal, it is quite evident that the successful farmer of the next decade will be the farmer who knows about things—the man who puts in almost as much time in planning as he does in executing. He will be a man with capital at hand—a man who carefully studies and weighs and then does not hesitate to invest a dollar toward the ultimate end of securing greater efficiency.

Lithe of body, small of stature, full of an excess of energy, and with ambitions equal to Ceasar's, her cheerful hearty cackle may be heard on nearly every American Farm. In the early morning her songs of happiness thrill the air and ere long she sings out the triumphant fact that she has accomplished her purpose. And what a factor she is in our life. She regulates the happiness of man and assists him to start the day right by giving him the best of American foods—the egg. Her part in the commercial world is also of large import. Think of the enormous value of her product, of the vast amounts of wealth which she creates in this enormous output of hers. On her, hinges much American happiness and still she is only considered a side issue of the farm.

Is it not time we regard her importance? Let her production record speak for itself. A moment's reflection shows us that this much maligned fowl is relegated to the background in live stock circles merely because of a lack of appreciation rather than through any real inferiority either in numbers or total value. So all together now, let us give a boost, and raise the business hen to the plane among live stock industries which is rightfully hers.—E. R. H.

The final adoption and recent successful initiation of the parcels post system prompt the following observations: First, it affords an excellent illustration of the power of the press and particularly, in this instance, of the agricultural press. The general agricultural press has supported this measure loyally and the re-

THE BUSINESS HEN

THE PARCELS POST

sults suggest that their concerted, determined and continued demand for some one thing is almost certain in time to attain the object sought. May this recent triumph be the means of encouraging a concerted demand for other much needed reforms.

Second, the much discussed cost of living will probably not be so generally affected as is popularly heralded. It is impractical from a financial standpoint to ship country produce outside of the fifty mile zone and it is only on the rural routes leading from a city that substantial savings will be effected. Moreover, considerable organization or development of closer relationship must take place before complete success will be general. The farmer must become acquainted with his city customer and the latter must learn to order in such quantities as will approach the upper limit in weight in order to make the transaction as economical as possible.

A reduction of rates and the adoption of the C. O. D. plan would very materially stimulate the use of the parcels post for the shipment of country produce.

The third observation which presents itself concerns, more particularly, the influence of the system upon the farm and the farmer himself. Hereafter there can be no middleman to blame for unsatisfactory goods when shipment is made by parcels post direct to the city customer. If goods are below standard the blame can be immediately and definitely fixed. It will be a clear case of the survival of the fittest and this cannot fail to act as a constant stimulus to up-to-date and efficient management and methods on the farm. It is going to prove a constant incentive to market gardeners, poultrymen, fruit-growers, dairymen and others to produce the finest possible products in order to obtain the highest possible prices. Corn, wheat and oats can not be shipped by parcels post, it is true, but good work will become a habit over the entire farm if it is made the rule in the dairy, the orchard, the garden and the poultry yard. "In the complex civilization of the times every onward step is felt beyond its most obvious limits. Its good effects reach far and wide and lead to other forms of progress."



Bouquets

Editor "The Agricultural Student,"
Ohio State University,
Columbus,
Ohio.

Your October number wins applause.
It's splendid.
Health.
Success.
Respectfully,

(Signed) A. H. Sandles,
Secretary of Agriculture, State of Ohio

"The Agricultural Student is the leader in
its field."—Editorial in The Ohio Farmer.

Editor Agricultural Student,
Ohio State University,
Columbus, Ohio:

You certainly are to be congratulated on the splendid publication you are now making. No one knows to what extent the upbuilding of the agricultural college has been due to this publication. It has helped to popularize the agricultural courses, it has acquainted thousands and tens of thousands of Ohio people with the work that the college has been doing, it has inspired thousands of country boys and has influenced a like number in pursuing agricultural studies. No doubt this little publication has been the foremost factor in placing the agricultural college where it stands today. * * *

(Signed) C. W. Burkett,

Editor American Agriculturist.

ALUMNI WHAT THE BUSY GRADS ARE DOING

D. W. Weist, Agr. '05, is assistant general secretary of the Y. M. C. A. at Cleveland, Ohio. Until recently he has been in California in the same work.

H. C. Thompson, Agr. '09, is a horticulturist at Springfield, Md. His wife was **Miss Clara Smith**, Dom. Sci. '11.

A number of Ohio State graduates who are connected with the University are:

J. S. Hine, Agr. '93, Professor in Entomology.

H. C. Price, Agr. '97, Dean of the Agricultural College.

O. Erf, Agr. '99, Professor in Dairying.

A. G. McCall, Agr. '00, Professor of Agronomy.

V. H. Davis, Agr. '00, Assistant Professor of Horticulture and Forestry.

W. L. Clevenger, Agr. '06, Assistant Professor in Dairying.

R. L. Shields, Agr. '07, is connected with the Agricultural Extension Department.

F. E. Bear, Agr. '08, Instructor in Agricultural Chemistry.

H. W. Vaughn, B. Sc. Agr. '08, and M. Sc. Agr. '09, is Assistant Professor in Animal Husbandry. At present, owing to sickness, Mr. Vaughn is on a leave of absence.

Geo. Livingston, Agr. '09, formerly connected with the extension department, is now Assistant Professor in Agronomy.

R. W. Harned, Agr. '06, is instructor and entomologist at the Mississippi Agricultural College.

George B. Merrell, Agr. '08, is farming at St. Petersburg, Florida.

R. R. Thompson, Agr. '12, is farming near Foster, Ohio.

B. L. Lukens, Ex. '09 and '10, has returned from Colorado and is now residing with his brother at Hillsboro, Ohio. His brother, William R., graduated in veterinary medicine in 1912 and has a good practice in Highland County.

Ernest Scott, Agr. '07, who received his M. D. in 1900, is a Columbus physician.

Ida M. Shilling, Dom. Sci. '10, is teaching at the Missouri State Normal School, Cape Girardeau, Mo.

A. H. Snyder, Agr. '03, is manager of a fruit farm near Mansfield, Ohio.

G. Homer Caywood, who enrolled in engineering in 1907-08, is managing a farm near Somerset, Ohio.

J. A. Chenoweth, '05 and '07, lives near Greenville, Ohio. He is a farmer and breeder of sheep and horses.

V. L. Cooper, who was a "Short-horn" in 1911 and 1912 is an orchardist at Magnolia, Ohio. **A. B. Cowdry**, a short ag., in 1885, is farming near Cortland, Ohio, and is also a fruit grower. **Carl Creek**, another "Short horn" is farming near Montpelier, Ohio.

E. C. Cook, ex. '05, is a dairy farmer near New Vienna, Ohio.

C. M. Curtis, '01 and '02, a former student in the engineering department, is a horticulturist at Willoughby, Ohio.

C. R. Crumrine, ex. '03, is a farmer and poultryman at Nova, Ohio.

H. B. Crall, ex. '04, is a farmer near Bucyrus, Ohio. **H. J. Commons**, Agr. '00, is farming near Centerville, Ind.

E. J. Hoddy, Agr. '00, is an inspector with the State Nursery Department at Columbus, Ohio.

Geo. W. Hood, Agr. '09 is an instructor at the Michigan Agricultural College, Lancaster, Mich.

J. W. Hammond, Agr. '06, is located at Wooster, Ohio.

R. W. McCauley, Agr. '12, who recently married **Miss Edna May Hicks**, of Oberlin, resides on a farm near Hicksville, Ohio.

C. L. Metcalf who graduated from the Arts College in 1907 and is now assistant entomologist in the North Carolina department of agriculture, was at the University during the Christmas vacation. Mr. Metcalf likes his work very much and says that North Carolina is peculiarly adapted to entomology research work, owing to the topography of the state.

Richard Faxon, Agr. '10, has left Montana where he was an inspector on the Montana state board of Horticulture and is now located with the James Mills Orchard Company at Maxwell, Calif.

J. E. Clawson, Agr. '08, is farming near Okeana, Ohio.

C. C. Hatfield, Agr. '04, who was secretary of the University Y. M. C. A. for two years and state secretary of County Y. M. C. A. work for Ohio five years, is now secretary for the Rural Y. M. C. A. work on the International Committee. His office is located in New York City.

J. C. White, B. Sc. Agr. '05, and M. Sc. Agr. '07, is county secretary of the Y. M. C. A. of Union County, Ohio.

Frederick S. Johnston, Agr. '99, is a prominent business man of Dallas Texas. He is a member of the firm of

Johnson, Elliott and Company, Bankers and Brokers.

M. O. Bugby, Agr. '03, is district superintendent of agriculture in the north east district of Ohio.

J. D. Hervey, Ex. '07 and '08 is located at Jefferson, Ohio. **Mr. Hervey** is a breeder of Jersey cattle.

J. C. McNutt, Agr. '07, who was on the advanced stock judging team, '06, and manager of the **Hartman Stock Farm** dairy, '08, is now Professor of Animal Husbandry and Dairying at the North Carolina Agricultural College.

George F. Abbot, '99, '01, is a live stock farmer at Chippewa Lake, Ohio.

M. F. Ainsworth, '06, '08, is a seedsmen at Mason City, Ill.

Thomas B. Foster, '06, better known on the gridiron and among basket ball stars some years back as "Tommy" was married January 4th. **Mr. Foster** is farming near Foster, Ohio.

George M. Barton, who took forestry in '09 and '11, is teaching school near Youngstown, Ohio.

B. F. Beck, Agr. '08 and '09 is superintendent of a farm near Tiffin, Ohio.

A. C. Beer, enrolled in agriculture in '03 and '04, is teaching at Sandyville, Ohio.

H. B. Bates, '08, '10, is a farmer and dairyman at New Bremen, Ohio. His farm is known as Maple Crest farm.

W. J. Barnett, Ex. '04, is a bank cashier in Shawnee, Okla.

Mrs. E. J. Baker, who formerly was Miss Nellie McClinans, enrolled in domestic science in 1901, '03, '04, '05, resides at Mt Sterling, Ohio.

O. C. Allehouse, Ex. '04, is farming at New Bedford, Ohio.

O. A. Allen, 1903-'07, better known among track athletes as "Red," is farming at Jeffersonville, Ohio.

CURRENT AGRICULTURAL LITERATURE

COMMENTS AND CRITICISMS ON CONTEMPORARY CONTRIBUTIONS

"The Rural Educator" makes its initial bow with the December number. It appears as a sixteen page, three column magazine but the number of pages will be materially increased in the near future.

As the name suggests, this publication is to be devoted to the interests of agricultural education in both the elementary and the high schools of the rural districts. Certain departments are given over to discussion of general rural educational problems while other pages take up specific plans and methods in greater detail.

Mr. G. A. Bricker, of the College of Education of the Ohio State University, is managing editor and a number of prominent educators in both the East and the West appear as contributing editors. The office of publication is located at Columbus.

Herbert Quick, until recently the editor of "The Farm and Fireside" is now engaged in establishing a farm magazine of his own to be known as the "Iowa Farmer." Mr. Quick is just now receiving much public notice in connection with his syndicated, serial story, "On Board the Good Ship Earth," running in all the daily newspapers published by the Scripps McRae League.

The issue for the Ohio Farmer for the week of January 11th, contained an article by the assistant editor, Mr. C.

A. Waugh, on the subject "The Feeding of Horses." This article is of special interest to Ohio State men because much of the data contained therein was collected among Columbus stables in connection with the course in "Feeds and Feeding" under Professor Plumb last year. Mr. Waugh has worked the material up in excellent shape and parts of it have been widely copied by other farm papers throughout the corn belt states.

Mr. Potter, formerly assistant editor of the "Farm and Fireside" has severed his connection with that publication and is now on the editorial staff of "Hoard's Dairyman."

At various times the work of the gypsy moth has been brought to our attention. The gypsy moth has a very interesting bit of history and in that connection we always think of the man who introduced the insect for experimental work in silk culture. The Country Gentleman of December 28 has an interesting article covering the work done in Massachusetts, entitled: "A State Against a Moth—A Scientist's Mistake and What It Has Cost." By F. W. Rane.

The National Stockman and Farmer is running a series of articles entitled "Captains of Industry." The first sketch appeared in the December 26 issue. This article was the biography of the director of our own Experiment

Station. Director Charles E. Thorne is truly a captain of industry. "He is known not only in this country but in all lands." Director Thorne is one of those few persons who never becomes so engrossed in his work that he will not take time to discuss matters of interest with the humblest tiller of the soil.

The second article of the series consisted of a sketch of the life of Dr. Thomas F. Hunt, dean of the Agricultural College, University of California. Dean Hunt's talk to the agricultural students at the annual banquet last spring will long be remembered by those of us who heard him on that occasion. At that time he held the same position at Penn State as he now does at the University of California.

The Breeders' Gazette was issued as a holiday edition on the 18th of December. The number was a veritable inventory of agriculture as it stood at the end of the year. The articles were penned by men of many occupations, viewing the various phases of agriculture at different angles.

"Beginnings in Animal Husbandry," by Prof. C. S. Plumb, is the title of a new book recently issued. It is intended for use by those who have not had an opportunity for such a course in college. The text contains chapters on breeds, judging, breeding, feeding, and poultry. It is illustrated with two hundred and sixteen photographs and contains a total of four hundred pages. The Webb Publishing Company of St. Paul, Minn., are the publishers. Price, \$1.25.



ANSWERED BY EXPERTS

Questions addressed to Dept. D, Agricultural Student, will be turned over to the particular faculty member most capable of answering, and question and answer will be printed in succeeding number of "The Agricultural Student". Questions will be answered by mail if stamped envelope is enclosed.

Scaly Legged Chickens.

We have a flock of very nice White Plymouth Rock chickens which are becoming infested with scaly legs. What is the nature of this malady and how may it be cured?

Scabby legs of fowls is caused by a mite that burrows under the skin of the legs and after a time pass to other birds of the flock. To destroy these mites, soak the legs of the affected fowl in strong soapy water for a few minutes. Remove and burn all loose scales, and then thoroughly grease the legs with vaseline or salty grease. Repeat the treatment each day until cured.

Cob-Rot Disease of Corn.

We would like to be informed regarding cob-rot in corn. It seems to be a disease that is attaining considerable importance. What in brief is known about it and how may it be controlled?

A new disease, known as cob-rot, has recently made its appearance in the cornfields of Ohio and the neighboring states. The spread of the disease has been so rapid and so alarming as to cause the state emergency board of Ohio to set aside \$2,000 for immediate use in studying the life history of the fungus and devising means for its control.

As the spores of this disease develop

they send minute threads out through the cob and grains. These threads dissolve out the substances that cement the parts of the cob together so that in the advanced stages of the disease the cob splits lengthwise and then easily falls apart into narrow strips. The infection is also indicated by the presence of a tuft of fibers projected from the end of the cob at the point of attachment of the shank.

Reports from the different sections of the state indicate that the feeding of the corn affected with cob-rot causes serious disturbances in the digestive tract of the animals. A number of deaths among horses have been attributed to the feeding of diseased corn and in a few cases the sickness among cattle has resulted fatally.

In view of the serious aspect of the disease at the present time, it would seem wise for the corn growers of the state to take some precautions for the coming season. Until more definite information is available the following is suggested:

1. Examine all seed ears carefully and discard all those that are infected.
2. Rake and burn all stalks in the infected fields.
3. Avoid as far as possible the planting of corn this year in fields that grew corn last year.
4. Use the manure containing infected cobs or stalks on some other crop than corn.

Use Sulphate of Iron.

I am very much interested in purebred poultry, my chickens being mainly White Orpingtons and Barred Rocks. Not long ago they developed bowel trouble, that seemed to be either severe diarrhea or cholera in light form. We began treatment and so far have lost none, but every once in a while one or two will develop the trouble. We try to keep everything clean and give the fowls plenty of fresh water. During the day they have access to hoppers filled with dry mash and at night they receive good first scratch feed in the litter. How can I correct the trouble? —R. F. W. Roscoe, Ohio.

The trouble seems to be entirely intestinal and no doubt is due to some kind of infection. I would suggest that you use Sulphate of Iron in the drinking water, using about one teaspoonful of Iron Sulphate to one gallon of fresh water. Of course the total amount of the solution will depend upon the number of birds you have.

Maintaining the Nitrogen Supply.

We read and hear a great deal about maintaining the nitrogen supply of our soils. In this connection will you please tell how many pounds of nitrogen per acre are actually removed by a 25 bushel crop of wheat and a 75 bushel crop of corn? Is it practical for a farmer to expect to keep up the nitrogen supply in the soil without the use of commercial fertilizer?

The problem of maintaining the nitrogen supply has caused scientists a good bit of anxiety since it was learned that nitrogen is one of the elements necessary to plant growth. There are two good reasons why this is true. First, nitrogen is easily lost either by being converted into soluble forms and leaching out in drainage water or by

denitrification and going off into the air. Second, nitrogen is the most expensive element of plant food when it must be purchased. This is best illustrated when we know that the nitrogen necessary to grow a 50-bushel crop of corn (about 50 pounds) would cost in its cheapest form not less than \$7.50.

Fortunately the growing of leguminous crops gives us a means of adding nitrogen to the soil without any expense other than seed. Using common red clover as an example: It is now estimated that for every ton of clover hay produced on the farm 40 pounds of nitrogen will be added, provided the hay is used as a feed or plowed under.

A 25-bushel crop of wheat will require 35 pounds of nitrogen, and a 75-bushel crop of corn will need about 75 pounds of nitrogen, or 120 pounds in the grain of a three-year rotation. In order to supply this amount it will be necessary to grow a three-ton crop of clover and allow it to remain on the farm to be plowed under if grain farming is followed. If live stock farming is followed, practically three-fourths of the nitrogen is excreted, and if the manure is carefully saved a large part of the plant food may be returned.

Practically then, the problem of maintaining a nitrogen supply can be solved by growing a leguminous crop once in three or four years if the crop is left on the farm, either as a feed for live stock or plowed under, where there is not enough live stock to consume all the feed. This has been demonstrated at the Rothamstead experiment station in England, where the per cent. of nitrogen in a soil is a little larger now than it was 60 years ago, when they began a four-year rotation in which the clover crop has been plowed under and the straw from the grain crops returned to the soil.

Secondary Agriculture

Devoted to the Interests of Agricultural Education in High and Common Schools

J. W. HENCEROTH

During this season when the weather is not favorable for field trips, it is an ideal time to take up the odds and ends that have been put aside. Now is a good time to see that the various specimens collected during autumn are classified and properly labeled. It will be well to make a careful study of the various articles in the agricultural collection. There is much to be studied in the school room that may best be done during the season when the weather will not permit outdoor work.

Teachers, don't think because you were raised on the farm or because all the pupils come from the farm that they know all there is to know about agriculture and farming. When we get down to the facts it is surprising how vague our ideas are about the common, everyday affairs. To know something about a certain phase of agriculture and to really know it are two widely different things. Further, to know a thing and then be able to tell it in an intelligent way so others can get it is still another thing. Hence don't be afraid to get at the facts and have the pupils express them in a clear, intelligent manner.

The Domestic Science Department announces a special course for teachers who have had no training along this line. This course is especially planned for those who are unable to take the

regular Domestic Science course, but who are required to teach it in the schools. It would be highly profitable for any one to take the work this summer. If you are interested, write to Miss Ruth Wardell or to Prof. A. B. Graham, of the Extension Department, Ohio State University, Columbus, Ohio.

SOMETHING FOR THE GIRLS!

In schools all over Ohio the attention of the boys is being turned toward agriculture and the many interests which center about the farm and its activities. The home is an institution in which girls as well as boys are interested, and in the management of which many girls will be engaged. In some of our common schools are found classes in cooking, sewing and hygiene, and in a number of places very fine laboratories and equipment have been provided for the use of these classes. In a larger number of schools there is nothing offered to the girls along these lines which is helpful in the home.

While a special equipment and a special teacher will greatly enhance the value of the work—just as in agriculture—there are some things worth while which may be done in the very small schools. Recognizing this fact, the Ohio State University, through its Extension Department, is offering a course in its Summer School this year for those who are already teaching

other subjects, and who are without any training along the lines of Domestic Science.

This is necessarily a very limited course, but it is felt that it will be possible to suggest some new facts and correlation of work which will be both instructive and interesting to a large number of girls, and for whom the small school may offer the only opportunity for instruction.

It is hoped that School Boards and Superintendents will be glad to provide some work of special interest to the girls, and will encourage some one of their teachers to take this work which is especially planned for them.

The classes will be held in the Domestic Science Department at the University, and the instruction will be given by the young women who are engaged in the Extension Schools through the year.

MISS RUTH WARDALL,
Domestic Science Dept.

WORK IN HARTFORD HIGH SCHOOL.

In addition to the usual grade work, the Hartford school requires a year's work in agriculture in the high school. The work consists of text book study, supplemented by bulletins, references and considerable laboratory work and observations and investigations by the pupils at home and within a radius of five miles of the school.

The subjects studied are improvements of plants and animals, with particular stress on heredity and environment; plant study, including methods of reproductions and conditions necessary for plant growth; soil, its compo-

sition, drainage, tillage, fertility, and adaption to farm crops; farm crops, including the garden, orchard, and enemies of farm crops and how to combat them; types and breeds of farm animals, including poultry and poultry management; feeds and feeding; the farm dairy; the farm home.

The laboratory exercises and observations include such work as variation in plants, struggle for existence, seed selection, grafting, budding, analysis of seed for purity and germination, testing of seed for starch and protein, field lessons in observations of soils, capillarity, water capacity, per cent of air in soils, separation of soil particles, per cent. of organic matter, mineral and moisture in soils, influence of humus on water-holding capacity, drainage, judging of grain, observations of crops and systems of cropping and cultivation, pruning, insects, fungous diseases, stock judging, and Babcock milk testing.

All high school pupils study Warren's Elements of Agriculture as a basal text and have access to about fifty standard works on agriculture. Assignments are made and references are looked up and reported to the class. In addition to this we have secured about forty sets of bulletins from the Wooster Experiment Station and from the U. S. Department of Agriculture for class use. These are loaned to pupils and studied as texts when we desire to supplement or work along lines of special interest to the community. Each pupil receives the Extension Bulletins and reads some farm paper. Articles in farm papers are frequently discussed in class.

H. L. BATES, Supt.

SOME HIGH SCHOOL WORK IN AGRICULTURE.

The introduction of agriculture into the Wooster High School took place three years ago. The beginning was small, indeed, as we had only a bare room and little money with which to purchase the necessary supplies.

The first class consisted of ten wide-awake boys who were in earnest. They and the teachers in charge got some lumber and tools and worked out a large laboratory desk, a cabinet for chemicals and apparatus, mountings for grains, feeds and soils. Also collections of various kinds were begun. Some money was appropriated for supplies and a few simple pieces of apparatus. The work continued the next year with larger classes and additional equipment consisting of a table, bulletin file, herbarium and many other pieces. This year another room is being fitted up for manual training work as it applies to the farm. Instead of purchasing the work benches at some supply house the boys are finding genuine pleasure in working out well-made, substantial benches. The intention is to make many articles needed on the farm and which might well be made on the farm during the rainy days. Each boy provides himself with hammer and saw while some other tools are provided by the school.

The first year is given to a study of general agriculture which, of course, introduces many subjects; while in the second year the plan is to reduce the number of subjects to about two, or not more than three and deal more intensely with these subjects. The subjects studied are chosen in accordance with what may be the separate needs of the different classes, usually giving first attention to soil study and allow-

ing the class to suggest what other subject is most desirable.

In the latter part of October of each year an exhibition of agricultural products and baked articles which the students have produced or helped to produce, is provided for by an agricultural association which was organized among the students three years ago. Various methods have been employed for securing money and articles for prizes. The first exhibit paid prizes aggregating twenty dollars, while the second distributed about sixty dollars. The difference in character of the second exhibit over that of the first was considerable, much more pains being taken to select exhibits of merit rather than merely show. In connection with these exhibits programs are given presenting discussions of farmsteads or farm arrangement in an illustrated way.

The work is not confined to laboratory rooms only, but field trips are conducted in the interest of soil, forest, crops, farms, buildings, birds, spraying, pruning, surveying, etc.

At the homes of a number of boys it is gratifying to find progressive work being done by the boys, indeed, some becoming locally prominent for their work.

As time and space do not permit an extensive article, suffice to say that we have merely begun a work in agriculture which is a field of wide possibilities for the boys and girls of Wooster High School.

J. E. BOETTICHER,
Teacher of Agriculture.

God made all the creatures and
Gave them our love and our fear,
To give sign, we and they are
His children, one family here.
—Browning.

AGRICULTURE IN THE PROSPECT SCHOOLS.

In our High School Warren's Book on Agriculture is used; the time allotted is one semester, followed by Botany the next semester. This plan gives an opportunity to conduct in a more complete way many experiments of plant germination. The herbarium work allows the pupil to be free to express what he sees growing, the condition of the plant and its relation to others of the same family.

The pupil has the freedom in each recitation of telling what he has observed in the plants and their surroundings.

In the last two years the Special Agricultural Extension Trains, where lectures on the leading features of

farm production were discussed, have done much to arouse interest on the part of the pupils to find out for themselves. The work of the book is illustrated on the trains, and the interest extended into the homes as the home work is mentioned to show the manner of handling the crops.

Rotation of crops is outlined and well reasoned out, describing the need and giving the result.

The class, after studying the text on the subject of beets, visited a field where the workmen were lifting and topping beets for hauling to the car. This gave them the practical as well as the book knowledge of the beet.

All the subjects are handled in the same manner by the help of the book.

J. B. BARKER, Supt.

Therefore am I still a lover of the
meadows and the woods
And mountains; and of all that we behold
From this green earth; of all the mighty
world
Of eye and eare — both of what they
half create,
And what perceive; well pleased to recognize
In Nature and the language of the
sense
The anchor of my purest thoughts, the
muse,
The guide, the guardian of my heart,
and soul,
Of all my moral being.

—Wordsworth.

WITH THE BREEDER

NOTES OF INTEREST AMONG THE FLOCKS AND HERDS

The readers of the Student will no doubt be interested to hear of a former Winter Course student who is making good on an Ohio dairy proposition. Curtis Ellett of Columbiana county, is developing one of the best small herds of Holstein-Friesian cattle in eastern Ohio. The herd as yet numbers but about eighteen head but the majority of the cows in it are in the advanced registry; quality rather than numbers being a prime requisite. One individual in this herd holds a record of 26 pounds of butter in 7 days.

An excellent breedy type of a South-down lamb was secured by Prof. Plumb at the International. Prof. Plumb purchased this lamb, which was champion of his class, from California University. His growthiness, width and type placed him far in advance of his competitors and he looks as though he will make a run for the ribbon next year.

The first Missouri National Egg Laying Contest closed at the State Poultry Experiment Station at Mountain Grove, Mo., at midnight on Oct. 31, 1912. The results were so satisfactory that another was begun on Nov. 15th. Seven hundred hens, representing twenty varieties of poultry gathered from England, Canada and 20 States of this country will compete.

The results of the first contest have not been especially startling, and neither have they proven that any one

variety possessed all the good qualities. The leading pen was one of R. C. Rhode Island Reds, which made a record of 1042 eggs for five hens, or an average of over 208 eggs per hen. The best individual record was made by Lady Showyou, a White Plymouth Rock Hen, which laid 281 eggs in twelve months.

Selfishness is certainly not the motto of the Animal Husbandry Department. If they have a good thing, they do not keep it to themselves, but share it. And such being the case, Prof. Plumb again shows his magnanimity by allowing the National Corn Exposition, which is held at Columbia, S. C., the use of his excellent and complete wool exhibit. A spirit such as this is an excellent attribute, and let us try to breed and foster such undertakings.

A letter recently received from the Russian government asks Prof. Plumb the privilege of translating his book, "Types and Breeds of Farm Animals," into the Russian language. Prof. Plumb has accepted and as soon as the book can be partially revised it will be printed for the benefit of our Russian friends.

Prof. Carmichael and Prof. Hammond, of the Experiment Station, have been secured to assist in the Animal Husbandry work with the "Short Ags." Mr. O. Pollock, '11, will also instruct these aspirants in a few points concerning Draft Horses.



January News Notes

The Ohio Good Roads Association has offered \$500 toward a series of lectures at the University in February or March on road construction.

Work is progressing rapidly on the new Archeological Museum, just south of the main entrance at High street. The style of this fine new building is the same as that of the new library.

Advocates of better roads in Ohio will ask the legislature to appropriate \$1,760,000 for the purpose of carrying on the inter-county road system work in 1913, because the revenue from a bill, which they will introduce in the general assembly, providing for a direct levy of one-half mill, will not be available until 1914.

The bill, looking to the completion of the plan to give Ohio a complete system of intercounty wagon roads, also incorporates the plan of using penitentiary labor in the construction of highways.

Francis L. Patton, a senior in the arts college, has been awarded the Cecil Rhodes scholarship offered to Ohio college students through competitive examinations. The scholarship provides for free tuition for three years at Oxford University, England.

Ohio State will be represented by a large exhibit at the chicken show to be held the middle of January by the Ohio Poultry Association. There will

be 26 cups offered as prizes at this show, in addition to the long list of cash prizes that are always hung up. A new feature this year will be a space devoted for birds for sale.

The women in some of the eastern cities who tried to lower the cost of living by buying eggs by the carload and selling them at cost have now turned their attention to chickens. They have helped pass a law that a chicken shall have no food for twenty four hours and no water for twelve hours before it is killed and offered for sale. The poultry class here have become interested in this subject and will ask the next legislature to enact a similar law in this state.

\$150,000 will be asked for by the Ohio State Board of Agriculture from the next legislature to use in erecting a live stock coliseum for judging purposes at the state fair grounds. As it is planned it is to seat 6,500 and the exhibition arena is to be 660 feet in circumference.

An experiment in poultry feeding is being carried on by the poultry department this winter, in an effort to determine on which feed the hens of the locality will thrive best. Six separate pens of S. C. White Leghorn pullets of sixty in a pen are being fed six different rations. Poor egg yields in Ohio are almost universal during the winter months.

Bee-keepers of the state will meet in convention January 14 and 15 in Townshend Hall.

Thirteen new separators have been installed in the dairy during the past year. Most every known make is now represented and they are of especial value during the winter course work.

Ohio's food laws with standards for only seven classes of foods is behind the national government and the majority of other states in this respect. There are about 30 general classes of foods for which other states have established standards.

For the first time in Ohio a Boys' Agricultural School was held at Elyria, Lorain county, early in January by the Extension department. Forty-six boys attended from all parts of the county which indicates that great interest was taken. H. S. Eswine and O. M. Kile were the instructors.

On Monday January 6, the new library was thrown open to the students. The new building is complete in every way and is the finest on the campus, having cost \$250,000. It is constructed of Bedford limestone with the architecture after the classic.

There is booking space for 240,000 volumes, although there is not that many in the University library as yet. The library was planned as a comfortable place to use books. All details trend toward this. There is a study room, for assigned lessons without reference books, reference hall, for use in reference work, periodical room where all current periodicals can be read, bibliography room which is the key to the library class rooms and check rooms.

The Extension school at Columbiana, Columbiana county, was recently called off on account of smallpox.

Dean H. C. Price spoke on European agriculture and credit systems during Farmers' week at the University of Virginia.

A. S. Neale has left Ohio to take charge of the dairy extension work at the Kansas Agricultural College at Manhattan, Kansas.

The University of Wisconsin has adopted Prof. C. S. Plumb's new book "Beginnings in Animal Husbandry." The text was written primarily for those who cannot study such a course in college and for short course students.

The Imperial Department of Agriculture of Russia has asked permission of Prof. C. S. Plumb to translate his book on "Types and Breeds of Farm Animals," to be used in that country in schools and colleges. They have requested Prof. Plumb to write a preface adapted to their conditions.

Some talk has passed concerning the merger of the state agricultural departments, by the incoming administration. The plan is similar to the one adopted in Wisconsin several years ago which is a combination of the various state departments and bureaus engaged in work related to agriculture.

Several successful farmers in the state spend part of their time during the winter months working for the extension department at the different schools held throughout the state. Those in the work now are L. P. Bailey, T. P. White, Poster Eliot and W. T. Hendrix.

Since the return of the Ohio corn boys from Washington, Secy. Sandles of the State Board of Agriculture has announced that he wants 1000 boys to make the trip next year. The boy's corn contest in Ohio is the only one of it's kind and is creating great interest among the boys and attracting the attention of agricultural workers in other states.

Numerous important meetings have taken place either in this city or on the campus within the last two weeks. Some of the most important were: American Delaine Merino Breeders' Association, Jan. 10; Ohio State Dairy-men's Association, Jan. 13-14; Ohio Bee-Keepers, Jan. 14-15; Ohio Percheron Breeders' Association, Jan. 15; Ohio Berkshire Association, Jan. 15.

Again over two hundred rural people of the state have come to spend eight weeks here to study the fundamentals of scientific agriculture. This winter course was started in order to reach those farmers in Ohio who are unable to avail themselves of the other courses in agriculture offered by the University. The time is limited but the practicability of the courses enables the short course students to get many of the essentials in the short time. Courses are given in straight agricultural work, poultry and dairy special courses. Farmers' week comes early in February when it is expected that a large number of farmers will avail themselves of the opportunity of coming in contact with the College work.

As in other years, the special four o'clock lectures are featured. Many prominent speakers from various parts of the United States will lecture.

In a letter written November 21,

1912, Mr. Sam Higginbottom, head of the department of agriculture, of Allahabad Christian College, Allahabad, India, describes agricultural conditions in that far country. He says, "We are fourteen inches short on our season's rainfall. The government officials are going through the district and unless rain falls within a week famine relief work will have to be opened. This lack of rain affects us very much for we see our wheat, barley and peas wither under our eyes, and yet our land joins on a river a half mile wide. To put in an irrigation plant for the two hundred acres would cost about five thousand dollars, but it would pay for itself in two years. We need an engine, pump and channels to get the water from the river to our land. All our work is wonderfully encouraging. We have our silos going, an American oil engine running the silage cutter. This is a source of great wonder to the natives. I believe if we can introduce silos into India we will have done a great thing, for within the last two months in the neighborhood of Ahmednagar a quarter of a million cattle have been sold, at prices ranging from fifty cents to a dollar, because there is no fodder to feed them. During the rains, or the early part of them, there was grass enough if it had been cut and stored in silos, but when the rain ceased early this withered up and most of it was lost. Now the draft oxen of thousands of cultivators are being sold for their hides, and when rain does fall the poor chaps are helpless because they have no oxen to draw their plows. It would be a great thing to prevent such a calamity as this and I believe it can be done. Several influential men both Indian and European have been to see our work and want to get hold of our American machinery. It can be

used under conditions when the poor Indian implements are cast aside as useless." Mr. Higginbottom is a graduate of the College of Agriculture.

Once a month for twenty-seven years the Practical Farmers' Club, of North Trumbull county, Ohio, has held a meeting to discuss "matters relating to husbandry, home comfort and economy." This organization is among the first of its kind in the state, dating back to October 10, 1885. Its membership is composed of twenty farmers and their families, who are actively engaged in agricultural pursuits. The original membership roll included fourteen families; two are still active in the Club's affairs. An entire day is set aside for the monthly meetings, which are held on the second Wednesday of each month, at the homes of the members. A program consisting of music, recitations, readings, essays, discussions of some topic of general interest is carried out. The Club is governed by a well arranged constitution and by-laws. Mrs. Jane Boorn, of Middlefield, is the secretary.

THE CORN SHOW.

The second Ohio State University Corn Show was held in Townshend Hall, Thursday and Friday, Jan. 9-10. There were about 85 contestants, many of whom entered a sample in each class to which they were eligible.

The exhibitors were divided into two classes. The one class was composed of those who have had advanced judging and the other open to any member of the Agricultural College. Mr. Welton, of the Ohio Experiment Station, was the man called upon to judge the show.

The principal prizes awarded were as follows:

Carl A. Gearhart had the best sample

of yellow corn shown in the class of advanced grain judging. Prize, a feed mill. Mr. Gearhart also won the students' judging contest, for which he had his name engraved on the Ohio Farmers' Cup.

Charles J. Foster had the best sample of white corn shown in the class of advanced grain judging. Prize, \$10.00.

Paul Gerlaugh had the best sample of white corn outside the class in advanced grain judging. Prize, \$10.00.

D. W. Williams had the best sample of yellow corn outside the class in advanced grain judging. He won sweep-



CUP AWARDED BY THE OHIO FARMER

stakes. W. Williams had his name engraved upon the National Stockman and Farmer's cup.

C. C. McDougall had the best ear in the single ear contest—Johnson County white. The prize was a cup, the gift of Secy. A. P. Sandles, which will be the permanent property of the winner.

Ray Harrison had the best sample of wheat. Prize, a disc harrow, the gift of the International Harvester Co.

Our Collegiate Advertisers

Fellow Students, let us show our appreciation not only by giving these firms our trade, but by boosting them to our friends. A thousand students here in school ought to be a class that any firm would be glad to get their goods before. Look over this list of advertisers and do your business with them, at the same time mentioning your connection with "THE STUDENT."



SEASON 1912-1913.

To Those Who Neglected to Learn to Dance

Prof. W. J. Rader's Academies of Dancing

will organize beginners' classes as follows:

SOUTH HIGH ACADEMY,

199½ S. High St. Phones: Auto 3456; Bell 5877.

Will organize a beginners' class Friday evening, February 7th, 7:30 o'clock.

NEIL AVE. ACADEMY,

647 Neil Ave. Phones: Auto 4431; Bell 6189.

Will organize a beginners' class Tuesday evening, February 4th, 7:30 o'clock.

OAK ST. ACADEMY,

827 Oak St. Phones: Auto 4431; Bell 6189.

The Academy has been rearranged for functions of all sizes and is complete in every respect.

TUITION

Gentlemen, per term of 10 lessons..... \$4 00

Ladies, per term of 10 lessons..... 3 00

Private lessons, \$1.00 per lesson; six lessons..... 5 00

Private lessons can be had afternoons or evenings.

Tuition can be paid \$1.00 per week until paid. The Waltz, Two-Step, Three-Step, Colum-

bus Minuet and Rye Waltz taught in one term.

WINTER PAVILION—Located on Neil Ave., between Goodale St. and Poplar Ave. Open

Friday and Saturday evenings. Operated on Summer plan.

ACADEMIES AND PAVILION CAN BE SECURED FOR PRIVATE PARTIES,

CLUB DANCES, FRATERNITY HOPS, ETC.

CLEARANCE SALE

of Pennants and Cushions

Closing out our entire stock of Felt
Goods. Prices cut in two.

Kiler-Walters Drug Co.

Eleventh Ave. and High St.

MARZETTI

Restaurant

1548 N. HIGH ST.

Headquarters for "Ohio State" Boys.

STRICTLY HOME COOKING.

FAMOUS PORK SANDWICH.

POOL.

The College Book Store

Agricultural Books, New and Second Hand

Please mention THE AGRICULTURAL STUDENT when writing advertisers.



Life Insurance Company

of Boston, Massachusetts

J. C. CAMPBELL, State Agent for Ohio and West Virginia
Hartman Building, Columbus, Ohio.

Total payment to policy-holders during the 50 years' experience,
over \$175,000,000.

Payment to policy-holders during 1911, represents an average of
over **Thirty-one Thousand Dollars** for each working day in the year.

For further information, address

W. E. & R. W. HOYER,
HARTMAN BUILDING, COLUMBUS, OHIO.
Citizens Phone 2853 Bell, Main 1390

The Randall Orchestra

"Ball-Room Experts"

Bell Phone, North 1487

Director, H. Kurtz Randall.

35 CHITTENDEN AVE

The Columbus Blank Book Mfg. Co.

Stationers and Office Outfitters

DESKS, FILING DEVICES, BOTH WOOD
AND STEEL

PRINTERS, BINDERS, ENGRAVERS

317-319-321 SOUTH HIGH ST., Columbus, O.

Both Phones:

Citizens 2219

Bell, Main 219

EVERYTHING IN STATIONERY AND
BLANK BOOK LINE.

LOUIS MONHIET Merchant Tailor

Suits Made to Order from \$18.50 to \$35.

All Kinds of Cleaning, Pressing and Repairing

1168 North High Street

Subscribe for
The Agricultural Student,
the greatest
college monthly published.
You cannot afford to
be without it.

Jack Earl

Ben Williams

FRATERNITIES AND BOARDING CLUBS
Always Find Our

MEET ME AT THE

Varsity Barber Shop Cigar Stand and Pool Room

The Students' Rallying Place

1585 NORTH HIGH ST., Opp. E. 11th Ave.

Phone, North 59.

Meats and Groceries..

STRICTLY FIRST CLASS

ABERNATHY BROS.

1609 HIGHLAND STREET

Citz. Phone 16504

Bell, North 857

Brosmer's Ice Cream Parlor

The Place to Take Your Friends.

We Do Catering.

HIGH ST. OPPOSITE 11TH AVE.

Neat Dress is the Signature of Prosperity. Let

S. BLOOM

The Tailor

fit you with a fall suit and overcoat.

682 N. HIGH ST.

Bell, Main 599

Dry Cleaning -- Pressing



1534 NORTH HIGH, AT NINTH AVE.

The "Velvet" finish on "Collars" allows the "Tie" to "Slip Easy."

The McDonald Hardware Co.

FIFTH AVE. AND HIGH ST.

We are always pleased to do business
with O. S. U. boys.

BLACKWOOD, GREEN & CO.

Hardware

Stoves and House Furnishing Goods
Slate and Metal Roofing

624 NORTH HIGH STREET

COLUMBUS, OHIO

Please mention THE AGRICULTURAL STUDENT when writing advertisers.

The Euclid Academy of Dancing

COR. HIGH ST. and EUCLID AVE. Five Minutes' Walk from Ohio State

Weekly Reception, Every Thursday Evening.

**Beginners' Class Wednesday and
Friday Evenings, 7:30 o'clock**

TUITION.

Gentlemen, per term of ten lessons.....	\$4 00
Ladies, per term of ten lessons.....	3 00
Private lessons	1 00
Gentlemen, per term of seven lessons.....	5 00
Ladies, per term of six lessons.....	4 00

Private lessons can be had any hour—morning, afternoon or evening. We guarantee to teach you to dance in one term of private or class lessons. Academy has been newly decorated throughout, which makes it more suitable than ever, and can be secured for private parties, fraternity hops, etc.

Prof. H. J. Guerr. Business & Residence Phones: Auto 8584; Bell N. 1759



ORR-KIEFER



COLVMBVS, O.

Orr-Kiefer Studio Co.

199-201 SOUTH HIGH STREET

Artistic Photography

"Just a little better than the best"

SPECIAL RATES TO STUDENTS

We Frame Pictures of all kinds — RIGHT

Maddox & Kilgore

AGRICULTURAL DRAWING INSTRUMENTS AND MATERIALS

HIGH ST., OPP. ELEVENTH AVE.

Please mention THE AGRICULTURAL STUDENT when writing advertisers.

Get The Best

Special to all Students at Ohio State: The New Student Folder only \$3.50 per dozen. A photo of the best style and strictly up to date.

Baker Art Gallery
COLUMBUS, O.

THE OLD RELIABLE, STATE & HIGH STS.

Clothes may not make the man,
but they help a lot to establish him

We make the kind of Clothes that make a man feel right. The Clothes wear right and Satisfy because our "kind" of Tailoring makes it possible ∴ ∴

The "So-Different" Tailory

C. H. BRADLEY, Prop.

Citizens Phone 5395

High Street at Tenth Avenue

NO BETTER CLOTHES THAN
MENDEL'S
—AT ANY PRICE—

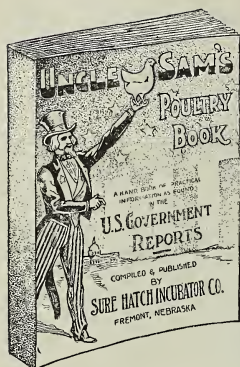
Suits made and guaranteed to fit, from
\$18 to \$40

MENDEL, The Tailor
545 N. HIGH ST.
Few Doors South of Goodale St.

H. B. Roberts
THE TAILOR

We do Cleaning, Pressing and
Repairing

221 WEST EIGHTH AVENUE

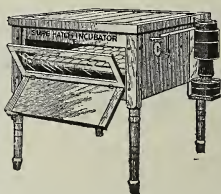


HOW TO SUCCEED WITH CHICKENS

is plainly and completely told in

UNCLE SAM'S POULTRY BOOK

A complete guide to poultry culture written by government experts. Worth \$10.00 to you and sold for only 20 cents, and by our plan you can get 50 cents back. Send 10 2-cent stamps or 2 dimes today for it. You can get it only from us. Uncle Sam says to use an incubator to get the most satisfactory results and



THE SURE HATCH INCUBATOR

is the only one built as he says an incubator should be made. Heavy, strong, of best material and modern features not found in any other machine. Complete control of heat. Hatches Chicks that Live. 60 days' free trial, guaranteed five years. Freight Paid. Big catalogue free. Send for it today and get your chicks onto the high-priced market as soon as possible. Chickens and eggs are going to be higher this winter than you have known them.

SURE HATCH INCUBATOR CO.,

Drawer B, Fremont, Nebr.

WHEN IT'S ILLUSTRATIONS or ENGRAVINGS

*of any kind
see or write*

Bucher Engraving Co.

80½ N. High St., Columbus, Ohio



**SPRAY
THOROUGHLY**

Grasselli Arsenate of Lead Paste Grasselli Lime Sulphur Solution

Recognized as Standard by Leading Fruit Growers

Why Use Any But the Best?

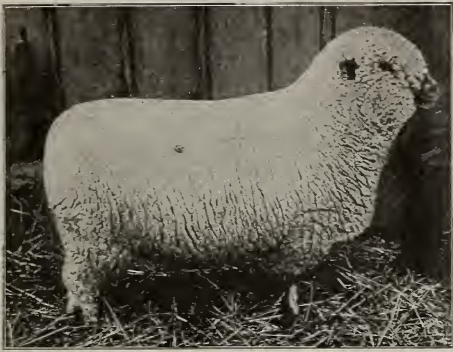
For sale by Dealers Everywhere. Correspondence Solicited

THE GRASSELLI CHEMICAL CO. The Arcade,
Cleveland, O.

Established 1839

Prominent Live Stock Breeders

These men solicit your trade. They have a reputation for honesty and square dealing and we recommend them to be reliable and safe. Mention "THE STUDENT" when you write.



Shropshire Sheep

Bred By

W. F. Palmer & Son
PATASKALA, OHIO.

We have some extra good home bred yearling rams and ewes bred to Imported Tanner or Buttar rams which we will offer at reasonable prices for fall delivery. Come and look over our flock, on Newark Traction line, near Wagram Stop.



Broad Head, 1220—First at Columbus, 1909.

Grass Lick Stock Farm

Breeders and Exhibitors of

Amer. Merino and Delaine Sheep

This flock showed at "thirteen" leading "State" and County Fairs in 1911, won 151 Firsts, 119 Seconds and 19 Flock and Champion prizes. Ewes and Rams for sale.

J. J. DEEDS & SON

PATASKALA, OHIO.

Newark Traction Line, Stop Moore's Corners.
Call up Mr. Schoeff.

Good Young Boars



We have for sale a few young boars of last spring's farrow, ready for service. This is an excellent opportunity to secure good herd boars at a reasonable price.

Write at Once To

WM.H.ROBBINS.SPRINGFIELD OHIO.



PURE BRED REGISTERED
**HOLSTEIN
CATTLE**

The most profitable dairy breed, greatest in size, milk, butter fat, and in vitality.
Send for FREE Illustrated Descriptive Booklets

Holstein-Friesian Asso., F. L. Houghton,
Sec'y. Box 154, Brattleboro, Vt.

Lake View Farm

Hull Bros., Props.,

PAINESVILLE, OHIO.

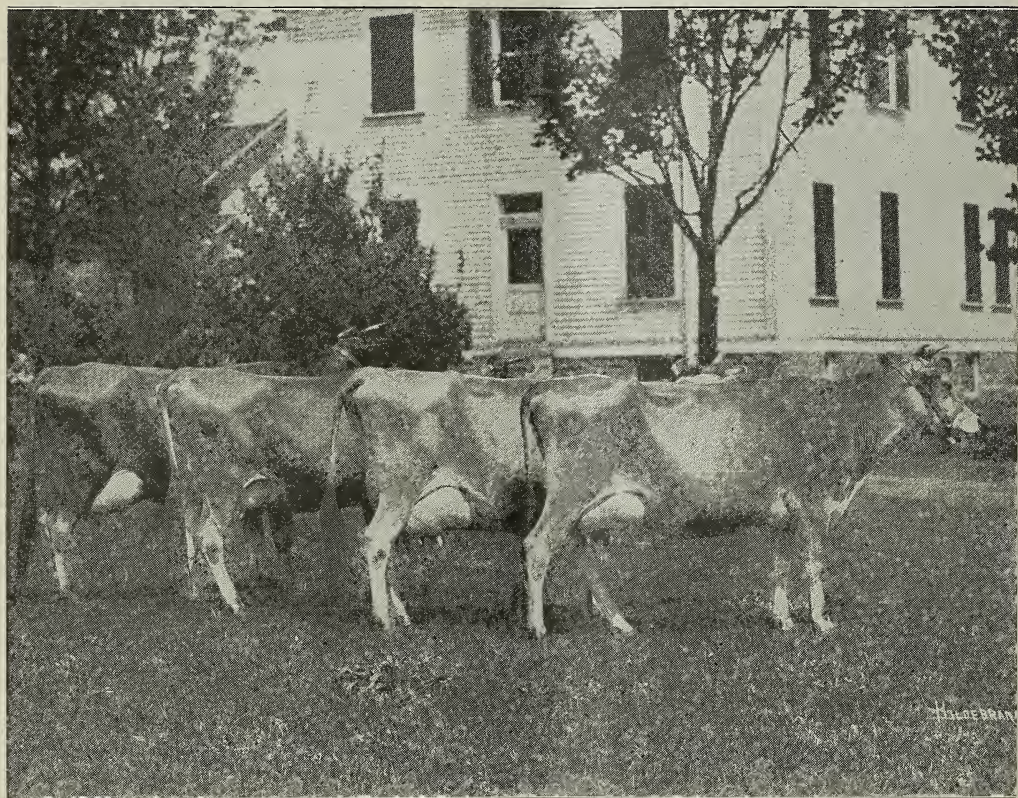
Brown Swiss Cattle

Please mention THE AGRICULTURAL STUDENT when writing advertisers.

The Hartman Stock Farm

OFFERS SPECIAL INDUCEMENTS

To those starting in the Jersey Cattle or Poultry business by selling the very best of Breeding and Individuality at Reasonable Prices.



FOUR DAUGHTERS OF LUCY'S CHAMPION (IMPORTED) 79315

Over Five Hundred Head, All Tuberculin Tested

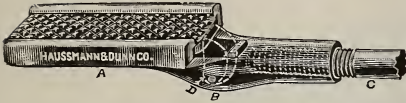
OUR HERD IS HEADED BY

LUCY'S CHAMPION 79315

His Daughters combine both Beauty and Utility

THE HARTMAN STOCK FARM

WE LEAD THE WORLD IN
VETERINARY INSTRUMENTS

DUNN'S "LOCK" FLOATS

(Patent Applied For.)

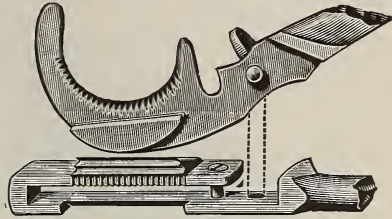
**ABSOLUTELY PERFECT—A MARVEL OF
 SIMPLICITY AND DURABILITY.**

Points of Superiority

Has no screws. Will hold a long or short Blade.
 Easily cleaned. No parts to rust.
 Requires No Special Blades.

824 Straight Float	\$2 50
825 Angular Float	2 50
826 Black Molar Float	2 50
827 Concave (spoon) Float	2 50
Set of 4 with 2 handles	9 00

Write for Special Circular of Dunn's Perfected
 Mouth Speculum.

DUNN'S "ASEPTIC" EMASCULATOR

(Patent Applied For.)

(Figure 1760.)

A modification of the Dr. Geo. R. White-Haussmann Emasculator. This instrument is essentially the same as the White-Haussmann Emasculator, but considerably improved by being made aseptic as shown in the illustration. This instrument and the White modification should not be confused with other so-called White Emasculators, as they are materially different in construction. The emasculators manufactured by us. Price, \$10.

SPECIAL PRICES TO STUDENTS—Send list of wants. We will not be undersold.

HAUSSMANN & DUNN CO.**VETERINARY INSTRUMENTS****TEXT BOOKS AND SUPPLIES**

708 SOUTH CLARK ST.

CHICAGO, ILLINOIS

Write for Catalogue and Special Prices for Cash

Choice Pure Bred Live Stock

is bred by the Animal Husbandry Department of the

Ohio State University

We breed Percherons, Clydesdales, Hackneys, Shorthorns, Jerseys, Holstein-Friesians, Guernseys, Shropshires, Merinoes, Berkshires, Duroc-Jerseys, Large Yorkshires and some other. We often have surplus stock for sale at a reasonable price.

Address, **DEPARTMENT OF ANIMAL HUSBANDRY,**

Ohio State University, Columbus, Ohio.

Polled Herefords

Nothing gone but the horns.

Hampshires

The Coming Breed.

Ashland Stock Farm

Write for Information to

E. Field & Son Camden, Ohio

Minor's Fluid

A GUARANTEED

Sheep and Hog Dip

If your dealer will not supply you,
 write us direct.

The W. E. Minor Disinfectant Co.

1519 Columbus, Rd., CLEVELAND, O.

Please mention THE AGRICULTURAL STUDENT when writing advertisers.

America's Leading Horse Importers



The Best Percheron and Coach Stallions THAT COME FROM FRANCE.

These horses are all for sale at lower prices than equal merit can be bought elsewhere.

McLaughlin Bros.

COLUMBUS, OHIO.

White-Stock Farm

CHEVIOT
AND SHROPSHIRE SHEEP
FOR SALE

R. & W. POSTLE, STOP 7, O. E. Ry.
Camp Chase, O.

Lagonda View Farm

Edward H. Mickle, Prop.,
Springfield, Ohio

Durocs - Rambouillets - Jerseys

FOR SALE—Yearling Boars sired by
Good E Nuff Again, 24,875, "The Duroc
Wonder;" Spring Lambs, sired by the
State Champion, Hyperion.

"LIKE BEGETS LIKE"

Polled Jersey Cattle

Rich milking, hornless beauties. Pleasant
to work with. Profitable to own. For names
of breeders, etc., write

CHAS. S. HATFIELD, Sec'y,
R. D. 4, Box 30. Springfield, O.

SUBSCRIBE FOR
The
Agricultural
Student

and keep in touch with the
Agricultural
College

THE SHEPHERD'S

If you want to buy, sell, or learn how to
properly care for sheep or goats you need
this beautiful publication; the best in the
world. Only fifty cents a year. Free sam-
ple copy to those mentioning this paper.
Agents wanted. Address 310 Monadnock
Building, Chicago, Ill.

JOURNAL.

Pentolia Stock Farm

G. A. Dix, Successor to C. D. F. Dix & Son
DELAWARE, OHIO

Breeders of

**Registered Percherons,
Berkshires and Shropshires**

Young Stock For Sale

Prices Reasonable, Breeding and Quality Con-
sidered

SHEPARD & OSBUN

COLUMBUS, O.

— Breeders of —

Poland China Hogs

We have the greatest Boars of
the breed—SENTINEL and
WHIRLWIND. Both sires of
Grand Champions. Stock for sale
at all seasons.

Visitors Welcome.

BE PROGRESSIVE

—BUY—

HIGH GRADE COMMERCIAL FERTILIZERS

The absolute "Measure of Value" of Acid or Rock Phosphate is the **cost per unit** of available phosphoric acid.

We manufacture and sell eleven brands of fertilizers. Our "Wheat Special" is the highest grade of acid phosphate sold in **OHIO**.

The M. Hamm Company

WASHINGTON C. H., OHIO.

EVERY Alumnus & Ex-Student

should be a regular reader of The Agricultural Student. You surely want to know of the growth and changes being made here.

Farmers' High Grade Fertilizers

Supply the Exhausted Elements of
Fertility

For all Soils and Crops

They feed the crop and permanently enrich the land. Write us for prices and terms on your requirements and mixed goods. Special attention given to inquiries from Ohio State Students and Alumni.

—THE—
Farmers' Fertilizer
—COMPANY—

East Windsor Ave. and Penna R. R.
COLUMBUS, OHIO.



GROUND PHOSPHATE ROCK



“PRAIRIE STATE” MEANS QUALITY

Our business is **exclusively** the production of ground Phosphate Rock.

We are **not** manufacturers of Chemical Fertilizers, with a “ground rock branch, or department.”

Our high grade rock is **not** sorted out.

The entire output of our mines goes direct to the consumer.

We deliver the absolute maximum of quality, at the lowest price you can **afford** to pay.

Buy it by the POUND of PHOSPHORUS; not by the ton of material.

QUALITY, NOT PRICE IS ECONOMY.

PRAIRIE STATE PHOSPHATE CO.

(The Natural Phosphate Co.)

Monadnock Block, CHICAGO, ILLINOIS.

CRUSHED LIMESTONE

For Agricultural Purposes

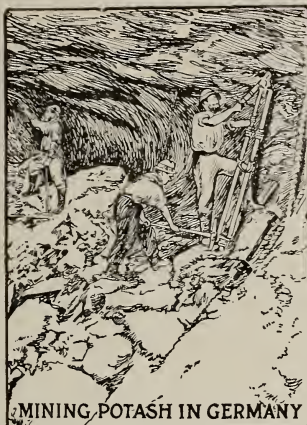
Corrects Soil Acidity

Many unsolicited letters have come from our friends and customers as to the excellent results of the use of our ground limestone. Much unproductive land has been reclaimed and made to produce fine crops, and all we have claimed for our product has been proven by the results.

**Price \$1.00 Net Ton in Bulk, or \$1.75
Net Ton in Sacks, \$2.25 in Cloth
Sacks, F. O. B. Quarry.**

WRITE FOR BOOKLET AND SAMPLE.

**THE CARBON LIMESTONE CO.
712 Stambaugh Building
YOUNGSTOWN, OHIO**



MINING POTASH IN GERMANY

Do Fertilizers Pay?

The Government and Educational "Authorities" spend considerable public money in printing contradictory statements on this point.

Great fortunes have been made in manufacturing fertilizers. They evidently pay the makers.

Farmers continue to increase their fertilizer purchases, indicating that they are profitable to the farmer.

But are the kinds which the manufacturers prefer to sell the most profitable to the farmer? Do they give the greatest profit consistent with maintaining the productiveness of the soil? Or do they merely supply the element most needed at the moment and reduce the available supply of the other elements?

The average fertilizer contains 4 times as much phosphoric acid as Potash. The average crop takes from the soil 3 times as much Potash as phosphoric acid. You can guess the answer. Use more Potash, for

Potash Pays

Send for FREE pamphlet on Profitable Farming, containing system of rational fertilizing and soil testing.

GERMAN KALI WORKS, Inc., 42 Broadway, New York

Monadnock Block, Chicago, Ill.

Bank & Trust Bldg., Savannah, Ga.
Empire Building, Atlanta, Ga.

Whitney Bank Bldg., New Orleans, La.

OTHERS GUARANTEE

WE DELIVER

"Nature's Source of Phosphorus"

GROUND PHOSPHATE ROCK

The most economical and only permanent source of phosphorus. An application of 2000 lbs. per acre will furnish an abundant supply for five to ten years and does not sour or injure the soil.

As to the methods of applying and benefits derived from this material we refer to results reported from your own Experiment Stations and those of the University of Illinois.

We are miners and shippers of Tennessee Phosphate Rock and have been steadily engaged in the business ever since the discovery of the Mt. Pleasant deposits.

We have the most complete and "up-to-date" drying and grinding plant in Tennessee and devote our time and attention to the preparation of GROUND PHOSPHATE ROCK for direct application.

A large storage capacity enables us to make prompt shipments. We are always ready to correct and make good our mistakes and will use every endeavor to give satisfaction.

Write me for guarantees and prices.

JOHN RUHM, Jr.

MT. PLEASANT

TENNESSEE

Ground Rock Branch of

RUHM PHOSPHATE MINING COMPANY

Miners and Shippers of Tennessee Phosphate Rock

The Agricultural Student

Realizes perhaps more than any one else, the immense importance of supplying the soil with AVAILABLE plant food and the very much lesser importance of supplying it with an additional quantity of unavailable plant food, such as rock phosphates, etc., of which it already has an ample supply. The key to the situation, the means of producing large crops without depleting the soil, lies in the use of AVAILABLE plant food and complete fertilizers where manure, green crops and humus are not to be had in sufficient quantity.

BOWKER'S FERTILIZERS

supply available plant food in the most acceptable forms and in ample quantity for all classes of crops, whether grown in the field or the market garden.

Our booklets may interest you.

Bowker Fertilizer Works

1204 Second National Bank Building,
CINCINNATI, OHIO.

Dollars From Sense

A little "Horse Sense" as applied to Colts and Corn.

Would you take the trouble to breed a fine colt and then turn him out to hustle for his food? You wouldn't raise very much of a colt.

Your Corn, like a young colt, needs proper food from the very start and through all the growing period to make the best of its ancestry.

The most economical and profitable way of supplying food to corn is by using

Armour's Fertilizers

These goods are made from Bone, Blood and Tankage from the great Armour meat packing plants, together with the highest grade Acid Phosphate and imported Potash Salts; finely ground, thoroughly cured and in best drilling condition. They are quick in starting and lasting in effect.

SPECIAL MIXTURES FOR ALL TYPES OF SOILS.

DOUBLE THE YIELD

IMPROVE THE QUALITY

HASTEN MATURITY

AND

INCREASE YOUR PROFITS

GET THE BEST RESULTS FROM YOUR WORK!

Write for our handy pocket memorandum book and Armour's Farmer Almanac for 1913, also name of nearest agent.

Armour Fertilizer Works

Union Stock Yards, Chicago

FOURTEEN DIFFERENT GRADES OF FERTILIZER

to select from, adapted for the various soils and crops of Ohio. Uniform mixtures and mechanical condition guaranteed.

Write us for literature.

Largest Independent Manufacturers in the Country.

Factories: Columbus, Ohio
Cordele, Ga.
Charleston, S. C.
Nashville, Tenn.
New Albany, Ind.

The Welch Fertilizer Co.

COLUMBUS, OHIO

Manufacturers INDEPENDENT PACKERS
AND PROGRESS BRAND FERTILIZERS



The Gold Medal Tractor and the Medal Winning Plow.

Gold Medal for OilPull

The Rumely OilPull Tractor carried the day at Winnipeg. Gold and silver medals and sweepstakes fell to the



Look at the results:

	OILPULL TRACTORS	Nearest Competitor in Class	Nearest Competitor in Any Class
Economy Brake Test.....	175.8	172.1	175.3
Maximum Brake Test.....	58.5	47.5	58.
Plowing Contest	203.45	174.6	199.15
Fuel Cost per Acre, Actual Winnipeg Prices	33.7c	39.5c	39.5c

OilPull scored highest in economy brake test, maximum brake test, plowing test, quality of plowing, possible distance traveled without replenishing water or fuel, and overload capacity. OilPull received perfect score for Brake h. p. hours per unit of fuel and Drawbar h. p. hours per unit of fuel. The OilPull Tractors finished every test in perfect condition.

Tractors are called upon to meet unusual conditions which can't always be foreseen. Remember the OilPull scored highest in Overload Capacity.

Kerosene is cheap—gasoline expensive. The OilPull burned kerosene—it proved to be the most economical tractor at the contest.

The Winnipeg figures are worth a thought—they make a fine study in tractor efficiency. Write us for the detailed reports of the Winnipeg judges. You should know about them.



RUMELY PRODUCTS CO.

(Incorporated)

Power-Farming Machinery

LA PORTE, IND.

WING'S QUALITY SEEDS

ALFALFA SOY BEANS SEED CORN

Our ALFALFA SEED IS GUARANTEED FREE FROM DODDER. WE RETAIL MORE SOY BEANS THAN ANY OTHER SEEDSMAN IN THE UNITED STATES. PEDIGREED SEED CORN and SPECIAL GRASS MIXTURES.

For several years we have been selling our ALFALFA SEED to nearly all the EXPERIMENT STATIONS and AGRICULTURAL COLLEGES throughout the "Corn Belt" and the New England States, and to the Department of Agriculture at Washington.

Send for our booklet, "ALFALFA AND HOW TO GROW IT." This gives the latest and best methods for growing ALFALFA, instructions so complete that anyone can succeed by following them, tells more about SOY BEANS than you can learn from any other source, tells you how to build up your farm by the use of the right crops and the proper fertilizers.

WING SEED COMPANY

Box V, MECHANICSBURG, OHIO.



"The Name Tells a True Story."

Superior Drills are used in every grain growing country on earth wherever grain is grown."

"The Superior feed sows every seed."

Superior Drills are made in every style and in all sizes, from one horse up.

It makes no difference what your seeding conditions are, you can rely on the Superior to do that work as it should be done. Superior Drills are sold under a warranty that absolutely protects the purchaser. Send for the Superior Catalogue. Read it carefully and then go to your local dealer and insist on seeing the Superior Drill.

THE AMERICAN SEEDING MACHINE CO. INCORPORATED
SPRINGFIELD, OHIO, U.S.A.

BEES FOR THE FARM

Need little attention and pay big profits. If you are interested in them send for a sample copy of Gleanings in Bee Culture. Also a bee supply catalog.

THE A. I. ROOT CO.,
Box 291, Medina, Ohio.

*Every Breeder & Feeder
should possess a copy of
Henry's Feeds and Feeding*

Please mention THE AGRICULTURAL STUDENT when writing advertisers.

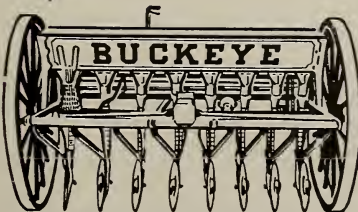
"THE HOUSE WITH FACILITIES"



COLUMBUS, OHIO.

BUCKEYE GRAIN DRILLS

"The Buckeye-
a wise buy."

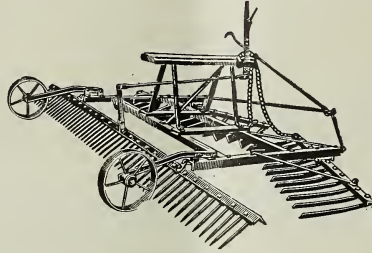


BUCKEYE DRILLS have many exclusive features to be had on no other Drill—features that mean much to the farmer. It is the only drill having the fertilizer hopper lined with galvanized metal; the only drill with a glass cone fertilizer feed. The Buckeye is the only drill that has a nested cone gear driver. The Buckeye is the drill with an absolute force feed that will sow all seeds accurately and put them in the ground at an even depth. Made in all styles and sizes. Go to your local dealer and insist on seeing the Buckeye Drill. Send for catalog.

The American Seeding Machine Co.
INCORPORATED
Springfield, Ohio, U.S.A.

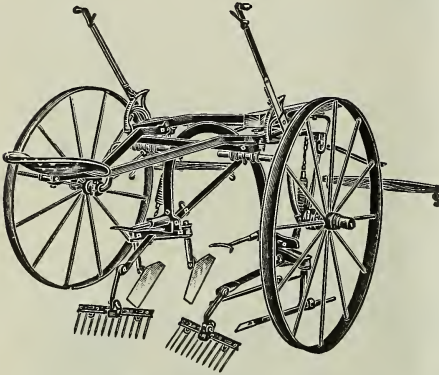
Please mention THE AGRICULTURAL STUDENT when writing advertisers.

The TOWER Pulverizer



Kills more weeds once over than three times with the best harrow ever invented. The United States Department of Agriculture, after a series of tests covering a period of six years, has discovered that weeds are the greatest enemies corn has to contend with.

The Tower Surface Cultivator



cuts the entire surface
of the soil, the same as
a hoe, so that not a
weed escapes.

This cultivator enabled Ivan Houser, a boy of Farmer City, Illinois, to raise the boys' prize acre

of corn, 122.6 bushels, and an average of 117 bushels for 7 acres.

Also Chester Yarnell, a 17-year-old boy of St. James, Minn., to win his prize over 1,300 competitors with 102 bushels and 58 pounds.

Write us for their statements as to how they did it.

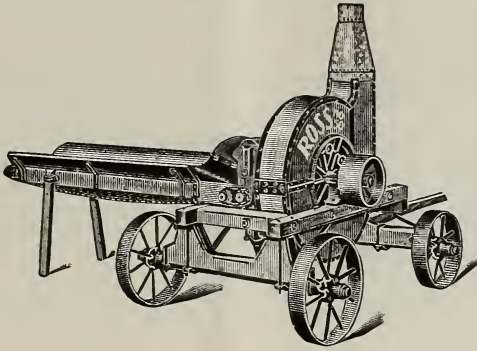
Be sure your new cultivator has TOWER on the tongue.

The J. D. Tower & Sons Co.

MENDOTA, ILLINOIS.

ROSS STAVE SILOS

With
Hinged Door



ROSS SILO FILLING MACHINERY With Blower

We are ENGINEERS in the line of equipping Farms with the modern method of FEEDING SYSTEM.

WE do business on the basis of GOOD QUALITY giving GOOD SATISFACTION.

To all those interested we say, find out what the ROSS SILOS and Machinery means to you. We invite detailed correspondence.

Manufactured by

THE E. W. ROSS CO., Springfield, O.

Established 1850—63 Years of Experience.



Agricultural Colleges and Experimental Stations Look To Us For Seed Indigenous To This Territory

We have the best that money and experience can produce. Our complete catalogue of Seeds and Farm Requisites will be mailed upon request.

The J. M. McCullough's Sons Co. SEEDSMEN

Established 1838

316 WALNUT STREET, CINCINNATI, OHIO.



An I H C Manure Spreader a Necessity on Every Farm

IF you expect to continue farming and raise a paying crop every good year, you must arrange to return to the soil the plant food taken from it by growing crops. Neglect is bound to decrease the productivity of your farm, and, in the end, to ruin it. When a farm is once run down it takes years of slow, careful upbuilding to bring it back to its original fertility.

If you attempt to fertilize by spreading manure with a fork, you fertilize unevenly and waste fully half the manure. When you use an I H C manure spreader properly, the fertility of your soil remains at a constant standard, while its physical condition improves from year to year, assuring bumper crops in good years, and the best possible when weather conditions are unfavorable.

I H C Manure Spreaders Kemp 20th Century, Corn King, Cloverleaf

will spread manure as it should be spread; in an even coat all over the field, light or heavy as may be needed, and pulverized so that the plant food elements in it combine with the soil.

An I H C Spreader has many mechanical advantages. The apron moves on steel rollers running on steel tracks. This construction reduces draft and prevents the apron from slipping under the load. The apron feed mechanism and beater gears are provided with shields which protect them from sleet, snow, and manure. A strong, durable feed moves the apron steadily toward the beater at any desired rate of speed. This steady movement insures even manure spreading whether the spreader is going up hill or down.

Compare the I H C apron feed mechanism with that of any other manure spreader and see how much stronger and more positive it is. I H C Spreaders are so constructed in every detail that they do their work positively, with the least effort on the part of driver or horses.

I H C Spreaders are made in different styles and sizes, for use in orchards, vineyards and gardens, on small and large farms. The I H C local dealer will show you the machine best adapted to your needs. See him for catalogues and full information, or, write

International Harvester Company of America
(Incorporated)

Chicago

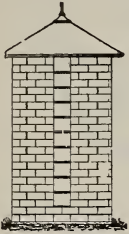
I H C Service Bureau

U S A

The purpose of this Bureau is to furnish, free of charge to all, the best information obtainable on better farming. If you have any worthy questions concerning soils, crops, land drainage, irrigation, fertilizer, etc., make your inquiries specific and send them to I H C Service Bureau, Harvester Building, Chicago, U. S. A.



A Reinforced Concrete Silo



embodies all that is latest and best in Silo construction. Just concrete and steel combined in approved, scientific manner and form, both in the making of the block and in the erection of the structure.

SIMPLE! STRONG! DURABLE!
COMMERCIALLY PRACTICABLE.

Will not burn, blow, nor rot down. Lowest after-cost of keep-up. Manner of construction and reinforcement fully covered by letters patent. Ask for illustrated and descriptive booklet and testimonials.

The Perfect Silo & Cistern Block Co.
DELAWARE, OHIO.

OUR SPECIALTIES

Caloric Noiseless Pumping Engines, Individual Water Works Systems, Hot Air and Hot Water Heating Systems, Low Voltage Electric Lighting and Power Plants for the Farm and Home.

Interurban Electric and Machine Company

“Modernizers of Country Homes”

Office and Demonstrating Rooms, 1547-49 NORTH HIGH ST., COLUMBUS, OHIO.
Bell Phone, North 3489.

We want your wants. We have what you want. Write us just what you want and we will save you money. We ask you for no settlement until your purchase has proven its worth. Could you ask more?

When in need of Surgical or Veterinary Instruments or Hospital Supplies, etc., do not forget we carry a full and complete up-to-date line. Catalogs sent FREE, POSTPAID, UPON REQUEST.

SHARP & SMITH

Manufacturers and Importers of

**High Grade Surgical and Veterinary
Instruments and Hospital Supplies**

103 NORTH WABASH AVE., CHICAGO, ILL.
2 Doors North of Washington St.

Established 1844.

Incorporated 1904.

WHEN DRILLING IS NECESSARY YOU NEVER STOP TO DIG :: ::

When you begin to clean your dairy, what do you do? Do you use a cleaning material corresponding to the pick and shovel or is it

Indian In Circle



In Every Package

Wyandotte
Dairyman's
Cleaner and Cleanser

the dairy cleaning agent which cleans clean quickly and is of the same efficiency as the modern drill which drives thru the ground in far less time and at less cost than the old tools used in hard digging?

Wyandotte Dairyman's Cleaner and Cleanser, like the drill, does its work in a clean cut manner. Bits of dirt, old butterfat, refuse and stale matter are first loosened, brought to the surface and then easily rinsed away in the wash water without the slightest injury to the surface cleaned or to the user's hands. Only the natural clean surface of the utensil remain, free from all odors, germs and bacteria.

The greatness of Wyandotte Dairyman's Cleaner and Cleanser lies in its power to clean everything in the dairy or factory sanitarly clean, with little work, and at a cost any dairyman can well afford.

Why hesitate to give Wyandotte Dairyman's Cleaner and Cleanser a trial? Your dealer guarantees these claims or it costs you nothing. Ask him for a five pound sack, or write your supply man for a keg or barrel.

THE J. B. FORD CO., Sole Mfrs, WYANDOTTE, MICH., U. S. A.

This Cleaner has been awarded the highest prize wherever exhibited.

Farming without an **Indiana Silo** is like carrying milk in a leaky bucket



The Indiana Silo preserves all your crop and stops the leaks that drain your bank account. Puts fat on your stock, milk in your pails, money in your bank. You can buy an Indiana Silo and never miss the money.

**WRITE FOR BOOKLET
ADDRESS NEAREST OFFICE**

INDIANA SILO COMPANY

Anderson, Ind.
78 Union Bldg.

Des Moines, Ia.
78 Indiana Bldg.

Kansas City, Mo.
78 Silo Bldg.

UNITED STATES

CREAM SEPARATORS

Have Two Big Exclusive Features

All tin and steel rusts. Therefore, nickel silver is used in the skimming sections of the United States (1913 model) Cream Separator.

Nickel silver is guaranteed not to RUST. It is also stronger and more durable than tin or steel discs.

The ordinary cream separator requires considerable time to wash.

A United States Separator (containing nickel silver sections) can be washed in half the time needed to wash other separators.

Not only does it have the only skimming device adapted for MECHANICAL WASHING, but nickel silver is easier to clean than tin or steel.

You can see these features and prove their value to your own satisfaction at the College or at your local U. S. agents.

Vermont Farm Machine Co.

BELLOWS FALLS, VT.

CHICAGO, ILL.

CHR. HANSEN'S Danish Butter Color, Cheese Color, Rennet Extract and Lactic Ferment Culture ARE THE Prize-Winning Preparations

1912—Wisconsin State Fair Victory
First Prize Butter—H. Nichols, Elkhorn, Wis. Score, 96.33.

1912—Minnesota State Fair Victory
First Prize Cheese—A. C. Werth, Appleton, Wis. Score, 98.50.

Makers of Fine Butter and Cheese use Chr. Hansen's Danish—the Prize-Winning Preparations. DO YOU?

Chr. Hansen's Laboratory
LITTLE FALLS, N. Y.

Feeds and Feeding

By PROF. W. A. HENRY

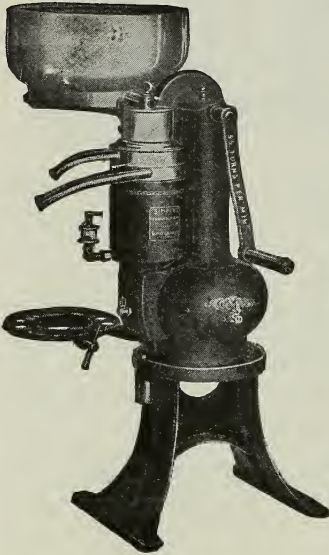
The standard work on feeding
live stock.

	Regular Price
Feeds and Feeding (retail)	\$2.25
Agricultural Student (year)	1.00
Total, -	\$3.25
Combination Offer, both -	\$2.50

This offer does not apply to students of Ohio Agricultural College.

The "SIMPLEX" Link Blade Cream Separator

Improved Design



LIGHTEST RUNNING.

LARGEST CAPACITIES.

CLOSEST SKIMMING.

The Only Practical Large Capacity Separator

500 lbs. \$75.00

900 lbs. \$ 90.00

700 lbs. 80.00

1100 lbs. 100.00

D. H. BURRELL & CO.

LITTLE FALLS, N. Y.

Manufacturers of Creamery, Cheese Factory
and Dairy Apparatus and Supplies.

Also, B-L-K COW MILKING MACHINES.

Cottonseed Meal DIXIE BRAND

For QUALITY and SERVICE write direct to

HUMPHREYS-GODWIN CO., Memphis, Tenn.

Dairymen Who Ship Their Cream

to us will tell you that they receive greater benefits and more advantageous arrangements than elsewhere. Why not try us and prove it. A postal brings Booklet. ∴

The West Jefferson Creamery Co.
COLUMBUS, OHIO

Please mention THE AGRICULTURAL STUDENT when writing advertisers.

MYERS PUMPS FOR ALL PURPOSES

Fig. 1345

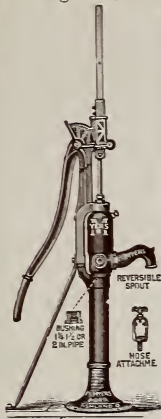


Fig. 1287

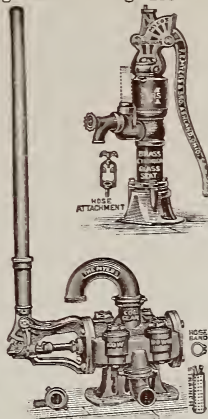


Fig. 1384



Fig. 1160



Fig. 333

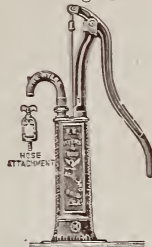


Fig. 1138

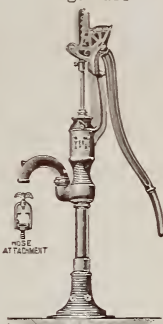


Fig. 813

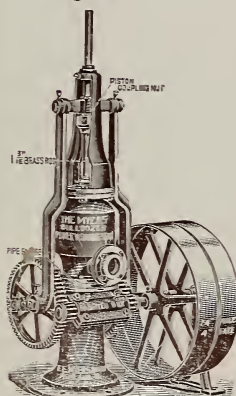
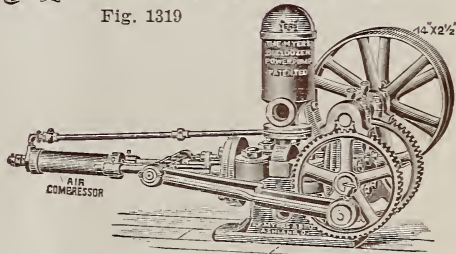


Fig. 1319



WELL PUMPS—Plain or Ratchet Handle, Single and Double Acting Force or Lift, Hand or Windmill.

HOUSE AND CISTERN PUMPS—Plain or Ratchet Handle, Single or Double Acting, Force or Lift.

PUMP STANDS—Plain or Ratchet Handle, Force or Lift, Hand or Windmill. For Tubular or Other Wells.

HYDRO-PNEUMATIC AIR PUMPS—Hand or Power, used in connection with Pressure Tanks for Private Waterworks Systems.

POWER PUMPS—Bulldozer Power Pumps, Working Heads, Pumping Jacks, Etc., for gas engine or motor. Large or

small capacity—320 to 7200 gallons per hour.

TANK PUMPS—Plain or Ratchet Handle for Hand use, or Back Geared for Gasoline Engine when desired.

SPRAY PUMPS—Bucket, Barrel and Knapsack for hand use. Large capacity Power Sprayers for Gasoline Engines. Nozzles, Hose, Fixtures, Etc.

CYLINDERS—Brass or Brass Lined with Non-Corrosive Glass Valve Seat. Power Working Barrels, Etc.

We are also headquarters for the famous Myers' Hay Unloading Tools, Myers' Stayon Door Hangers, Etc.

Ask your dealer or write to us for circulars.

F. E. MYERS & BRO., Ashland, Ohio

Ashland Pump and Hay Tool Works.

DE LAVAL

CREAM SEPARATORS

**There's no good reason why you
should wait until spring
before getting one**

On the contrary, you may buy a DE LAVAL NOW and save half its cost by spring. Moreover, if you can't conveniently pay cash you can buy a DE LAVAL machine on such liberal terms that it will actually pay for itself.

As to your NEED of a separator, if you have the milk of even a single cow

to cream you are wasting quantity and quality of product every day you go without one. This waste is usually greatest in cold weather and with cows old in lactation, and it counts most, of course, when butter prices are high. Then with a separator there is always the sweet, warm skimmilk, and saving of time and labor, in addition.



When it comes to a choice of separators DE LAVAL superiority is now universally recognized. Those who "know" buy the DE LAVAL to begin with. Those who don't "know" replace their other separator with a DE LAVAL later—thousands of users do that every year. If you already have some other machine, the sooner you exchange it for a DE LAVAL the better.

Why not start 1913 right in dairying? SEE and TRY a DE LAVAL NOW when you have plenty of time to investigate thoroughly. The nearest DE LAVAL agent will be glad to set up a machine for you and give you a free trial of it.

The new 72-page De Laval Dairy Hand Book, in which important dairy questions are ably discussed by the best authorities,

is a book that every cow owner should have. Mailed free upon request if you mention this paper. New 1913 De Laval catalog also mailed upon request. Write to nearest office.

THE DE LAVAL SEPARATOR CO.

NEW YORK

CHICAGO

SAN FRANCISCO

SEATTLE